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Number 120

SATELLITE ORBITAL DATA

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SATELLITE ORBITAL DATA

**Material prepared under the supervision of I. G. Izsak
Chief, Research and Analysis Division**

**Smithsonian Institution
Astrophysical Observatory**

Cambridge 38, Massachusetts

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ORBITAL INFORMATION¹

The orbital elements have been derived by the indicated staff members of the Satellite Tracking Program, Smithsonian Astrophysical Observatory, employing the SAO Differential Orbit Improvement Program (DOI).

Field-reduced photographs from SAO Baker-Nunn cameras comprise the majority of observations used in computing these orbital data. SAO Moonwatch teams, the NASA Minitrack network, foreign observatories, miscellaneous U.S. and foreign observers, and various radar installations also contribute valuable observations.

As opposed to osculating elements, the elements presented here are mean elements in the sense that the effects of the short period perturbations due to the earth's oblateness have been eliminated.

SAO mean elements have been derived from observations covering several days, and are given in the form of a table. The successive sets of elements are essentially independent of each other. They are dependent, however, in the sense that high-order coefficients in the secular and the long-periodic terms are generally considered as known and as constant for periods of several weeks or months, as dictated by convenience.

The times of epoch in the mean elements are reckoned in Julian Days, but for the sake of convenience the number 2400000.5 has been subtracted to provide an abbreviated notation which we call "Modified Julian Days," or "MJD."

The units of the orbital elements are degrees for angular quantities, megameters ($Mm = 10^6$ meters) for linear quantities, and revolutions for the mean anomaly M and its derivatives.

The tabulated values of the SAO mean elements give the values of argument of perigee ω , right ascension of the ascending node Ω , inclination i , eccentricity e , and mean anomaly M as functions of time $t = T - T_0$ (where T_0 is the reference epoch) expressed in days. The single digit placed at the right of each value represents the standard error for that element and refers to the last digit given.

The same tabulation also gives the mean (anomalistic) motion n , the orbital acceleration $n'/2$ or n' (dn/dt), and the semimajor axis a or the geocentric distance of perigee q (in megameters). Of the last three columns, the one headed N indicates the number of observations used for the computation of a set of elements; the one headed D , the number of days used; and the one headed σ , the standard error of the representation of the observations relative to their assumed accuracy.

SAO smoothed elements have been derived from observations covering about two weeks or more. They are given as functions of time and generally include both secular and periodic terms. The general expression for any element E is

$$E = E_0 + E_1 t + E_2 t^2 + \dots + \sum A_i \sin(B_i + C_i t)$$

¹This work was supported in part by grant NsG 87-60 from the National Aeronautics and Space Administration.

where $t = T - T_0$ is again expressed in days. The presence of a standard error associated with a particular coefficient indicates that this quantity was determined by the process of differential orbit improvement; the absence of a standard error means that the quantity was taken from some other source.

In our computer program, the inclination and the argument of perigee are referred to the true equator of date, the right ascension of the ascending node, however, is reckoned from the mean equinox of 1950.0 along the corresponding mean equator to the intersection with the moving true equator of date, and then along the true equator of date. To transform from right ascension of the node as determined by the DOI to right ascension of the node referred to the mean equinox of date, one uses

$$\Omega^\circ = \Omega^\circ(\text{DOI}) + 3^\circ 508 \times 10^{-5} (\text{MJD} - 33281),$$

where MJD stands for the Modified Julian Day of the date.

The mean (anomalistic) motion n can be obtained from the smoothed elements by differentiating the expression for M , and the orbital acceleration n' can be obtained by twice differentiating the same expression for M .

The sun-perigee data are related to the perturbing effects of atmospheric drag. From left to right, are the Modified Julian Day (MJD); the perigee height Z (in kilometers) above the International Ellipsoid of Reference; the geocentric latitude of the perigee (φ); the angular geocentric distance (ψ) from the perigee of the sun; and the difference in right ascension (D. R. A.) between the perigee and the sun; all these angles are expressed in degrees. In the last column we give the rate of change of the period (\dot{P}) expressed in days per day.

Satellite 1958 Alpha

Beatrice Miller

I. SAO smoothed elements

The following elements are based on 65 observations and are valid for the period July 1 through July 16, 1962.

$$T_o = 37854.0 \text{ MJD}$$

$$\omega = (357^\circ 13 \pm 2) + (7^\circ 512 \pm 5)t + .001218t^2 + .3041 \cos \omega$$

$$\Omega = (269^\circ 350 \pm 6) - (5^\circ 037 \pm 1)t - .379 \times 10^{-5}t^2 + .0032 \cos \omega$$

$$i = (33^\circ 205 \pm 1) + .0002031t - .40 \times 10^{-5}t^2 - .0041 \sin \omega$$

$$e = (.09211 \pm 1) + .3459 \times 10^{-4}t - .155 \times 10^{-5}t^2 + .0004972 \sin \omega$$

$$M = (.55428 \pm 4) + (13.62285 \pm 1)t + (.667 \pm 5) \times 10^{-4}t^2 - (.32 \pm 5) \times 10^{-6}t^3 \\ + (.55 \pm 12) \times 10^{-7}t^4 - .0008704 \cos \omega$$

Standard error of one observation: $\sigma = \pm 2.68$.

The following elements are based on 52 observations and are valid for the period July 16 through August 1, 1962.

$$T_o = 37870.0 \text{ MJD}$$

$$\omega = (117^\circ 50 \pm 3) + (7^\circ 519 \pm 7)t + .001218t^2 + .3041 \cos \omega$$

$$\Omega = (188^\circ 748 \pm 7) - (5^\circ 041 \pm 1)t - .379 \times 10^{-4}t^2 + .0032 \cos \omega$$

$$i = (33^\circ 203 \pm 3) + .751 \times 10^{-4}t - .40 \times 10^{-5}t^2 - .0041 \sin \omega$$

$$e = (.09213 \pm 2) - .1501 \times 10^{-4}t - .155 \times 10^{-5}t^2 + .0004972 \sin \omega$$

$$M = (.53706 \pm 7) + (13.62501 \pm 2)t + (.677 \pm 3) \times 10^{-4}t^2 + (.39 \pm 5) \times 10^{-6}t^3 \\ - .0008704 \cos \omega$$

Standard error of one observation: $\sigma = \pm 3.63$.

The following elements are based on 59 observations and are valid for the period August 1 through August 16, 1962.

$$T_o = 37885.0 \text{ MJD}$$

$$\omega = (230^\circ 37 \pm 3) + (7^\circ 500 \pm 6)t + .0001218t^2 + .3041 \cos \omega$$

$$\Omega = (113^\circ 156 \pm 8) - (5^\circ 042 \pm 1)t - .379 \times 10^{-4}t^2 + .0032 \cos \omega$$

$$i = (33^\circ 201 \pm 3) - .449 \times 10^{-4}t - .40 \times 10^{-5}t^2 - .0041 \sin \omega$$

$$e = (.09196 \pm 2) - .6151 \times 10^{-4}t - .155 \times 10^{-5}t^2 + .0004972 \sin \omega$$

$$M = (.92729 \pm 7) + (13.62700 \pm 1)t + (.520 \pm 9) \times 10^{-4}t^2 - (.116 \pm 8) \times 10^{-5}t^3 \\ - (.95 \pm 19) \times 10^{-7}t^4 - .0008704 \cos \omega$$

Standard error of one observation: $\sigma = \pm 4.10$.

The following elements are based on 36 observations and are valid for the period August 16 through September 1, 1962.

$$T_o = 37900.0 \text{ MJD}$$

$$\omega = (343^\circ 24 \pm 3) + (7^\circ 552 \pm 3)t + .00039t^2 + .3041 \cos \omega$$

$$\Omega = (37^\circ 555 \pm 7) - (5^\circ 038 \pm 1)t - .679 \times 10^{-4}t^2 + .0032 \cos \omega$$

$$i = (33^\circ 210 \pm 2) - .0003132t + .968 \times 10^{-5}t^2 - .0041 \sin \omega$$

$$e = (.09198 \pm 5) + .4348 \times 10^{-4}t - .149 \times 10^{-5}t^2 + .0004972 \sin \omega$$

$$M = (.34242 \pm 8) + (13.628559 \pm 8)t + (.75 \pm 1) \times 10^{-4}t^2 - (.42 \pm 6) \times 10^{-6}t^3 \\ - (.12 \pm 2) \times 10^{-6}t^4 - .0008704 \cos \omega$$

Standard error of one observation: $\sigma = \pm 2.58$.

The following elements are based on 33 observations and are valid for the period September 1 through September 15, 1962.

$$T_o = 37916.0 \text{ MJD}$$

$$\omega = (103^\circ 73 \pm 1) + (7^\circ 535 \pm 2)t + .00039t^2 + .3041 \cos \omega$$

$$\Omega = (316^\circ 857 \pm 3) - (5^\circ 0431 \pm 6)t - .679 \times 10^{-4}t^2 + .0032 \cos \omega$$

$$i = (33^\circ 205 \pm 1) - .34 \times 10^{-5}t + .968 \times 10^{-5}t^2 - .0041 \sin \omega$$

$$e = (.09184 \pm 3) - .420 \times 10^{-5}t - .149 \times 10^{-5}t^2 + .0004972 \sin \omega$$

$$M = (.41912 \pm 3) + (13.631247 \pm 5)t + (.0001045 \pm 2)t^2 + (.40 \pm 5) \times 10^{-6}t^3 \\ - .0008704 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1.68$.

The following elements are based on 86 observations and are valid for the period September 15 through October 1, 1962.

$$T_0 = 37930.0 \text{ MJD}$$

$$\omega = (209^\circ 180 \pm 7) + (7^\circ 528 \pm 1)t + .00039t^2 + .3041 \cos \omega$$

$$\Omega = (246^\circ 239 \pm 3) - (5^\circ 0469 \pm 5)t - .679 \times 10^{-4}t^2 + .0032 \cos \omega$$

$$i = (33^\circ 202 \pm 1) + .0002676t + .968 \times 10^{-5}t^2 - .0041 \sin \omega$$

$$e = (.09180 \pm 3) - .4592 \times 10^{-4}t - .149 \times 10^{-5}t^2 + .0004972 \sin \omega$$

$$M = (.27713 \pm 2) + (13.634096 \pm 4)t + (.876 \pm 6) \times 10^{-4}t^2 - (.34 \pm 3) \times 10^{-6}t^3 \\ + (.58 \pm 8) \times 10^{-7}t^4 - .0008704 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1.48$.

II. SAO mean elements -- Satellite 1958 Alpha

3 July - 29 September 1962

T (MJD)	ω	Ω	i	e	M	n	$n^{1/2}$	q	N	D	σ
37848.0	312.20 2	299.577 7	33.208 2	.09179 1	.81938 5	13.621810 2	.538E-4 8	6.724687	24	8	.81
37852.0	342.40 3	279.433 7	33.207 2	.09195 2	.30802 7	13.622638 2	.71E-4 1	6.723216	35	8	1.15
37856.0	12.44 2	259.288 5	33.205 1	.092255 9	.79943 4	13.623245 1	.661E-4 4	6.720779	39	8	.75
37860.0	42.44 2	239.130 7	33.202 2	.09250 1	.29328 5	13.623836 2	.659E-4 6	6.718786	31	8	.96
37864.0	72.43 3	218.981 6	33.201 2	.09262 2	.78936 7	13.624370 4	.61E-4 1	6.717676	19	8	.92
37868.0	102.36 2	198.826 5	33.199 2	.09254 2	.28760 4	13.624868 1	.624E-4 6	6.718117	21	8	.55
37872.0	132.32 1	178.661 1	33.199 1	.09243 1	.78795 3	13.625395 1	.777E-4 5	6.718784	28	8	.47
37876.0	162.27 2	158.516 5	33.204 1	.09216 1	.29068 5	13.625866 1	.582E-4 5	6.720629	36	8	.71
37880.0	192.36 2	138.358 5	33.206 1	.09193 1	.79508 6	13.626302 1	.581E-4 6	6.722152	41	8	1.00
37884.0	222.57 3	118.197 7	33.207 2	.09154 2	.30117 7	13.626698 2	.550E-4 9	6.724972	30	8	1.14
37888.0	252.87 3	98.05 1	33.199 6	.09150 3	.80874 7	13.627018 3	.38E-4 2	6.725114	20	8	1.25
37892.0	283.05 3	77.881 9	33.203 6	.09156 3	.31789 7	13.627437 2	.54E-4 2	6.724513	13	8	1.06
37896.0	313.39 2	57.711 2	33.207 2	.09177 3	.82845 6	13.628043 2	.639E-4 7	6.722804	14	8	.46
37900.0	343.53 5	37.562 9	33.212 3	.09227 5	.3418 3	13.628662 2	.78E-4 1	6.716019	16	8	.66
37904.0	13.74 2	17.370 9	33.204 2	.09194 4	.85700 6	13.629254 2	.522E-4 9	6.721167	20	8	.53
37908.0	43.75 2	357.195 4	33.202 1	.09216 3	.37487 5	13.629787 2	.87E-4 1	6.719365	24	8	.45
37912.0	73.69 2	337.022 4	33.202 1	.09240 3	.89553 4	13.630587 2	.102E-3 1	6.717320	21	8	.48
37916.0	103.60 2	316.862 7	33.200 2	.09229 4	.41950 4	13.631397 4	.989E-4 9	6.717870	16	8	.69
37920.0	133.62 2	296.683 5	33.202 2	.09213 4	.94650 4	13.632215 2	.1120E-3 8	6.718786	14	8	.80
37924.0	163.683 7	276.504 1	33.204 1	.09186 2	.47687 2	13.632974 1	.922E-4 6	6.720533	17	8	.26
37928.0	193.52	256.321 9	33.203 4	.0920 3	.0112 3	13.633680 2	.983E-4 8	6.718965	29	8	.44
37932.0	224.004 8	236.140 5	33.206 1	.09142 2	.54637 3	13.634352 1	.854E-4 7	6.723327	53	8	.49
37936.0	254.26 1	215.955 7	33.208 2	.09110 4	.08515 3	13.635050 3	.104E-3 2	6.725468	57	8	.76

Table 1
RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1958 ALPHA

MJD	Z	φ	ψ	D.R.A.	\dot{P}
PERIGEE IN EARTH SHADOW					
37848.	350.	-23.9	157.4	155.3	-0.580E-06
37852.	345.	-9.5	155.9	158.9	-0.765E-06
37856.	343.	6.8	145.0	160.0	-0.712E-06
37860.	343.	21.7	133.5	162.7	-0.710E-06
37864.	345.	31.5	126.8	170.4	-0.657E-06
37868.	346.	32.3	127.4	181.7	-0.672E-06
37872.	344.	23.9	135.6	190.3	-0.837E-06
37876.	343.	9.6	148.8	193.8	-0.627E-06
37880.	344.	-6.7	161.8	195.1	-0.626E-06
37884.	350.	-21.7	161.9	198.3	-0.592E-06
37888.	353.	-31.6	150.8	206.6	-0.409E-06
37892.	352.	-32.2	140.6	218.4	-0.582E-06
37896.	348.	-23.5	133.8	227.5	-0.688E-06
37900.	338.	-8.9	129.6	231.2	-0.840E-06
37904.	343.	7.5	124.6	232.8	-0.562E-06
37908.	344.	22.3	117.0	236.1	-0.937E-06
PERIGEE IN SUNLIGHT					
37912.	345.	31.7	107.5	244.4	-0.110E-05
37916.	346.	32.2	98.7	256.0	-0.106E-05
37920.	344.	23.4	93.1	264.8	-0.121E-05
37924.	343.	8.9	91.0	268.6	-0.992E-06
37928.	341.	-7.3	90.2	269.9	-0.106E-05
37932.	348.	-22.4	86.3	273.8	-0.919E-06
37936.	353.	-31.8	78.3	282.4	-0.112E-05

Satellite 1959 Alpha 1

Maria Gutierrez

I. SAO smoothed elements

The following elements are based on 138 observations and are valid for the period June 30 through July 31, 1962.

$$T_o = 37860.0 \text{ MJD}$$

$$\omega = (222^\circ 567 \pm 4) + (5^\circ 2927 \pm 4)t - .1895 \times 10^{-4}t^2 + .1377 \cos \omega$$

$$\Omega = (134^\circ 165 \pm 2) - (3^\circ 5202 \pm 2)t - .170 \times 10^{-5}t^2 + .0143 \cos \omega$$

$$i = (32^\circ 8793 \pm 5) - .00626 \sin \omega$$

$$e = (.164349 \pm 8) + .1894 \times 10^{-5}t + .000420 \sin \omega$$

$$M = (.581719 \pm 7) + (11.4778418 \pm 7)t - (.28 \pm 2) \times 10^{-6}t^2 - (.84 \pm 18) \times 10^{-8}t^3 \\ - .000388 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1.00$.

The following elements are based on 114 observations and are valid for the period July 31 through August 31, 1962.

$$T_o = 37892.0 \text{ MJD}$$

$$\omega = (31^\circ 881 \pm 3) + (5^\circ 2899 \pm 3)t - .1895 \times 10^{-4}t^2 + .1377 \cos \omega$$

$$\Omega = (21^\circ 526 \pm 2) - (3^\circ 5194 \pm 2)t - .170 \times 10^{-5}t^2 + .0143 \cos \omega$$

$$i = (32^\circ 8785 \pm 9) - .00626 \sin \omega$$

$$e = (.16441 \pm 1) + .1894 \times 10^{-5}t + .000420 \sin \omega$$

$$M = (.872200 \pm 6) + (11.4778097 \pm 7)t - (.42 \pm 2) \times 10^{-6}t^2 + (.17 \pm 2) \times 10^{-7}t^3 \\ - .000388 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1.28$.

The following elements are based on 141 observations and are valid for the period August 31 through September 30, 1962.

$$T_o = 37922.0 \text{ MJD}$$

$$\omega = (190^\circ 557 \pm 3) + (5^\circ 2911 \pm 3)t - .1895 \times 10^{-4} t^2 + .1377 \cos \omega$$

$$\Omega = (275^\circ 961 \pm 2) - (3^\circ 5194 \pm 2)t - .170 \times 10^{-5} t^2 + .0143 \cos \Omega$$

$$i = (32^\circ 8815 \pm 5) - .00626 \sin \omega$$

$$e = (.16433 \pm 1) + .1894 \times 10^{-5} t + .000420 \sin \omega$$

$$M = (.206424 \pm 7) + (11.4778182 \pm 6)t + (.76 \pm 1) \times 10^{-6} t^2 - (.51 \pm 17) \times 10^{-8} t^3 \\ - .000388 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1.05$.

T (MJD)	w	Ω	i	e	M	n	$n^{1/2}$	q	N	D	σ
37846.0	148.38 1	183.408 4	32.870 1	.16458 2	.89225	2	11.477843 4	-.05E-6 4	6.934072	46	8 .39
37850.0	169.54 1	169.327 6	32.874 1	.16446 2	.80361	2	11.477868 8	.023E-6 6	6.935111	45	8 .37
37854.0	190.668 7	155.269 4	32.878 1	.16423 1	.71505	1	11.477820 6	.02E-6 5	6.936995	52	8 .40
37858.0	211.854 5	141.194 3	32.8805 7	.164086 9	.62635	1	11.477828 3	.02E-6 3	6.938214	46	8 .30
37862.0	233.084 9	127.105 6	32.883 1	.16403 2	.53757	2	11.477808 5	.04E-6 5	6.938728	32	8 .50
37866.0	254.301 9	113.026 6	32.888 2	.16394 2	.44881	2	11.477796 7	-.018E-5 6	6.939429	30	8 .63
37870.0	275.509 8	98.948 7	32.889 2	.16392 2	.36002	2	11.477819 7	.033E-5 9	6.939574	32	8 .55
37874.0	296.72 1	84.878 8	32.886 2	.16398 3	.27124	2	11.477811 5	-.01E-7 6	6.939081	25	8 .61
37878.0	317.922 9	70.798 6	32.887 3	.16411 2	.18246	2	11.477810 6	-.01E-6 1	6.938019	31	8 .66
37882.0	339.103 6	56.733 3	32.883 3	.16426 2	.09369	1	11.477812 5	-.016E-5 4	6.936749	31	8 .52
37886.0	.278 7	42.662 4	32.881 3	.16444 4	.00493	2	11.477810 8	-.01E-5 1	6.935265	20	8 .52
37890.0	21.446 8	28.572 8	32.874 4	.16462 5	.91619	2	11.477831 7	.01E-5 1	6.933819	21	8 .49
37894.0	42.576 8	14.486 7	32.872 2	.16473 4	.82753	2	11.477831 8	-.01E-5 1	6.932831	27	8 .45
37898.0	63.685 7	.413 4	32.871 1	.16479 2	.73886	1	11.477850 7	-.03E-6 8	6.932341	29	8 .40
37902.0	84.784 6	346.334 5	32.873 2	.16480 2	.65025	1	11.477844 4	-.011E-5 4	6.932265	36	8 .55
37906.0	105.886 6	332.256 5	32.874 1	.16478 2	.56161	1	11.477846 5	.02E-6 4	6.932415	41	8 .52
37910.0	126.978 5	318.179 4	32.876 7	.16472 2	.47298	9	11.477839 4	.06E-6 3	6.932953	37	8 .39
37914.0	148.106 6	304.101 4	32.8780 8	.16460 2	.38429	1	11.477818 5	.08E-6 2	6.933973	34	8 .34
37918.0	169.27 1	290.025 6	32.880 2	.16444 3	.29552	2	11.477811 7	.07E-6 3	6.935255	30	8 .39
37922.0	190.429 8	275.947 5	32.883 2	.16424 3	.20678	2	11.477823 7	.017E-5 4	6.936909	28	8 .45
37926.0	211.607 6	261.873 2	32.886 2	.16410 3	.11803	2	11.477804 5	-.013E-5 6	6.938142	29	8 .35
37930.0	232.816 5	247.796 3	32.884 2	.16395 3	.02920	2	11.477802 4	-.011E-5 5	6.939329	34	8 .32
37934.0	254.023 4	233.717 3	32.881 1	.16390 2	.94042	1	11.477800 4	.06E-6 5	6.939783	45	8 .36

Table 2
RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1959 ALPHA 1

MJD	Z	ϕ	ψ	D.R.A.	P
PERIGEE IN SUNLIGHT					
37846.	557.	16.5	111.9	236.6	0.759E-08
PERIGEE IN EARTH SHADOW					
37850.	557.	5.7	117.5	236.9	-0.349E-08
37854.	559.	-5.8	123.0	236.6	-0.304E-08
37858.	562.	-16.6	126.3	237.0	-0.304E-08
37862.	564.	-25.7	125.8	239.5	-0.607E-08
37866.	567.	-31.5	121.7	244.7	0.273E-07
37870.	567.	-32.7	115.6	251.7	-0.501E-07
PERIGEE IN SUNLIGHT					
37874.	566.	-29.0	109.2	258.0	0.152E-09
37878.	562.	-21.3	103.7	262.0	0.152E-08
37882.	559.	-11.2	99.4	263.4	0.243E-07
37886.	557.	0.2	96.2	263.5	0.152E-07
37890.	556.	11.4	93.1	263.7	-0.152E-07
37894.	557.	21.5	89.4	265.3	0.152E-07
37898.	559.	29.1	84.8	269.3	0.455E-08
37902.	560.	32.7	79.4	275.9	0.167E-07
37906.	560.	31.5	74.1	283.0	-0.304E-08
37910.	559.	25.7	70.0	288.5	-0.911E-08
37914.	557.	16.7	67.8	291.3	-0.121E-07
37918.	557.	5.8	67.5	292.2	-0.106E-07
37922.	559.	-5.6	68.1	292.4	-0.258E-07
37926.	561.	-16.5	68.3	293.3	0.197E-07
37930.	565.	-25.6	66.7	296.2	0.167E-07
37934.	567.	-31.5	62.5	301.8	-0.911E-08

Satellite 1959 Eta

Maria Gutierrez

I. SAO smoothed elements

The following elements are based on 111 observations and are valid for the period June 30 through July 31, 1962.

$$T_o = 37860.0 \text{ MJD}$$

$$\omega = (128^\circ 599 \pm 4) + (4^\circ 8923 \pm 4)t + .000116t^2 + .1170 \cos \omega$$

$$\Omega = (91^\circ 106 \pm 2) - (3^\circ 2864 \pm 2)t - .175 \times 10^{-4}t^2 + .0160 \cos \omega$$

$$i = (33^\circ 3509 \pm 8) + .1348 \times 10^{-4}t - .0071 \sin \omega$$

$$e = (.18881 \pm 2) - .432 \times 10^{-5}t + .0004175 \sin \omega$$

$$M = (.481140 \pm 7) + (11.0874058 \pm 8)t + (.540 \pm 2) \times 10^{-5}t^2 + (.55 \pm 2) \times 10^{-7}t^3$$

$$- .0003331 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1.43$.

The following elements are based on 133 observations and are valid for the period July 31 through August 31, 1962.

$$T_o = 37890.0 \text{ MJD}$$

$$\omega = (275^\circ 407 \pm 3) + (4^\circ 8934 \pm 3)t - .396 \times 10^{-4}t^2 + .1170 \cos \omega$$

$$\Omega = (352^\circ 492 \pm 2) - (3^\circ 2875 \pm 2)t - .589 \times 10^{-5}t^2 + .0160 \cos \omega$$

$$i = (33^\circ 3571 \pm 6) - .248 \times 10^{-4}t - .0071 \sin \omega$$

$$e = (.188753 \pm 7) - .175 \times 10^{-5}t + .0004175 \sin \omega$$

$$M = (.108221 \pm 6) + (11.0876734 \pm 5)t + (.270 \pm 2) \times 10^{-5}t^2 + (.22 \pm 2) \times 10^{-7}t^3$$

$$- .0003331 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1.15$.

The following elements are based on 115 observations and are valid for the period August 31 through September 30, 1962.

$$T_o = 37922.0 \text{ MJD}$$

$$\omega = (71^\circ 982 \pm 6) + (4^\circ 8934 \pm 5)t - .396 \times 10^{-4}t^2 + .1170 \cos \omega$$

$$\Omega = (247^\circ 315 \pm 2) - (3^\circ 2871 \pm 3)t - .589 \times 10^{-5}t^2 + .0160 \cos \omega$$

$$i = (33^\circ 3539 \pm 9) - .248 \times 10^{-4}t - .0071 \sin \omega$$

$$e = (.188775 \pm 8) - .175 \times 10^{-5}t + .0004175 \sin \omega$$

$$M = (.91718 \pm 1) + (11.087903 \pm 1)t + (.378 \pm 3) \times 10^{-5}t^2 + (.59 \pm 28) \times 10^{-8}t^3 \\ - .0003331 \cos \omega$$

Standard error of one observation: $\sigma = \pm 11.10$.

II. SAO mean elements -- Satellite 1959 Eta

1 July - 27 September 1962

T (MD)	ω	Ω	i	e	M	n	$n^{1/2}$	q	N	D	σ
37846.0	60.182 9	137.117 7	33.343 1	.18921 3	.25823 1	11.087309 2	.6E-5 1	6.886864	30 6	.65	
37850.0	79.71 1	123.965 8	33.342 2	.18926 6	.60757 2	11.087339 4	.2E-5 2	6.886404	27 6	.95	
37854.0	99.23 1	110.827 6	33.343 2	.18924 4	.95693 2	11.087385 2	.1E-5 2	6.886570	29 6	.78	
37858.0	118.781 6	97.664 4	33.346 1	.18917 2	.306482 9	11.087413 1	.4E-5 1	6.887177	25 6	.42	
37862.0	138.29 1	84.519 8	33.351 2	.18913 4	.65623 2	11.087448 3	.6E-5 1	6.887448	22 6	.48	
37866.0	157.837 7	71.371 5	33.349 3	.18894 4	.00612 2	11.087484 4	.4E-5 2	6.889072	22 6	.50	
37870.0	177.42 4	58.24 1	33.347 5	.1890 3	.3560 2	11.087541 9	.6E-5 4	6.888846	14 6	.42	
37874.0	197.98 2	45.070 6	33.359 4	.18873 6	.70643 6	11.087578 5	.6E-5 3	6.890804	11 6	.49	
37878.0	216.600 7	31.928 2	33.356 2	.18854 2	.05671 2	11.087599 2	.70E-5 7	6.892437	22 6	.41	
37882.0	236.184 6	18.780 4	33.355 3	.18840 2	.40720 1	11.087613 3	.3E-5 2	6.893658	28 6	.45	
37886.0	255.83 1	5.635 5	33.366 5	.18833 4	.58247 2	11.087629 4	.4E-5 2	6.893655	23 6	.43	
37890.0	275.424 8	352.492 7	33.364 2	.18835 2	.93290 2	11.087634 3	.2E-5 2	6.893994	18 6	.45	
37894.0	294.972 9	339.340 8	33.362 1	.18837 2	.28350 1	11.087658 1	.64E-5 9	6.893968	19 6	.40	
37898.0	314.63 1	326.201 7	33.362 2	.18843 2	.80958 2	11.087696 3	.1E-5 2	6.893367	22 6	.49	
37902.0	334.221 7	313.056 5	33.359 1	.18857 1	.16044 1	11.087737 2	.5E-5 1	6.892150	40 6	.44	
37906.0	353.85 2	299.90 1	33.359 2	.18862 3	.18862 4	11.087777 3	.8E-5 2	6.891668	29 6	.40	
37910.0	13.44 2	286.774 9	33.350 3	.18880 4	.86237 6	11.087821 3	.8E-5 2	6.890162	21 6	.50	
37914.0	32.98 2	273.609 9	33.357 5	.18894 2	.21384 3	11.087869 3	.4E-5 1	6.888947	27 6	.38	
37918.0	52.46 2	260.490 6	33.333 5	.18912 2	.56540 4	11.087915 2	.5E-5 2	6.886765	21 6	.35	
37922.0	72.00 3	247.328 7	33.347 8	.18923 6	.91713 7	11.087950 6	.2E-5 5	6.886407	13 6	.64	
37926.0	91.56 1	234.170 8	33.350 3	.18920 2	.26884 3	11.087959 2	.5E-5 1	6.886698	21 6	.46	
37930.0	111.07 1	221.012 7	33.347 3	.18919 1	.62079 3	11.087996 2	.6E-5 1	6.886710	29 6	.51	
37934.0	130.61 1	207.857 5	33.347 1	.18908 1	.97282 2	11.088026 2	.5E-5 1	6.887637	37 6	.51	

Table 3
RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1959 ETA

MJD	Z	ϕ	ψ	D.R.A.	\dot{P}
PERIGEE IN SUNLIGHT					
37846.	513.	28.5	81.8	93.2	-0.976E-07
37850.	514.	32.7	84.2	98.1	-0.325E-07
37854.	515.	32.9	89.0	104.1	-0.163E-07
37858.	514.	28.8	95.0	109.2	-0.651E-07
37862.	512.	21.5	101.1	112.0	-0.976E-07
37866.	512.	12.0	106.3	112.7	-0.651E-07
37870.	510.	1.4	110.4	112.3	-0.976E-07
PERIGEE IN EARTH SHADOW					
37874.	513.	-9.8	114.3	112.5	-0.976E-07
37878.	516.	-19.1	116.0	112.1	-0.114E-06
37882.	520.	-27.2	119.1	114.5	-0.488E-07
37886.	521.	-32.2	123.0	119.5	-0.651E-07
37890.	522.	-33.2	127.7	125.8	-0.325E-07
37894.	521.	-29.9	132.5	131.6	-0.104E-06
37898.	518.	-23.0	136.2	135.4	-0.163E-07
37902.	515.	-13.8	137.7	136.8	-0.813E-07
37906.	513.	-3.4	136.7	136.8	-0.130E-06
37910.	512.	7.3	134.1	136.5	-0.130E-06
37914.	512.	17.4	131.3	136.9	-0.651E-07
37918.	512.	25.8	129.9	139.1	-0.813E-07
37922.	514.	31.5	131.0	143.7	-0.325E-07
37926.	515.	33.3	135.0	150.1	-0.813E-07
37930.	514.	30.9	141.6	156.2	-0.976E-07
37934.	513.	24.7	150.0	160.5	-0.813E-07

Satellite 1959 Iota 1

Maria Gutierrez

I. SAO smoothed elements

The following elements are based on 176 observations and are valid for the period June 30 through July 31, 1962.

$$T_o = 37860.0 \text{ MJD}$$

$$\omega = (234^\circ 48 \pm 1) + (3^\circ 407 \pm 1)t - .001193t^2 + 1^\circ 2489 \cos \omega$$

$$\Omega = (260^\circ 2429 \pm 8) - (4^\circ 19007 \pm 8)t - .111 \times 10^{-4} t^2 + .0053 \cos \omega$$

$$i = (50^\circ 3065 \pm 7) - .0014 \sin \omega$$

$$e = (.03619 \pm 1) + (.30 \pm 9) \times 10^{-5} t + .000789 \sin \omega$$

$$M = (.18965 \pm 4) + (14.233349 \pm 4)t + (.594 \pm 2) \times 10^{-5} t^2 + (.30 \pm 2) \times 10^{-7} t^3 \\ - .0031294 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1^\circ 40$.

The following elements are based on 156 observations and are valid for the period July 31 through August 31, 1962.

$$T_o = 37892.0 \text{ MJD}$$

$$\omega = (343^\circ 49 \pm 2) + (3^\circ 415 \pm 2)t - .001193t^2 + 1^\circ 2489 \cos \omega$$

$$\Omega = (126^\circ 155 \pm 1) - (4^\circ 1904 \pm 1)t - .111 \times 10^{-4} t^2 + .0053 \cos \omega$$

$$i = (50^\circ 3069 \pm 9) - .0014 \sin \omega$$

$$e = (.03620 \pm 1) + (10 \pm 10) \times 10^{-5} t + .000789 \sin \omega$$

$$M = (.65935 \pm 5) + (14.233500 \pm 5)t + (.602 \pm 3) \times 10^{-5} t^2 - (.116 \pm 3) \times 10^{-6} t^3 \\ - .0031294 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1^\circ 83$.

The following elements are based on 96 observations and are valid for the period August 31 through September 30, 1962.

$$T_0 = 37922.0 \text{ MJD}$$

$$\omega = (85^\circ 64 \pm 1) + (3^\circ 403 \pm 1)t - 001193t^2 + 1^\circ 2489 \cos \omega$$

$$\Omega = (0^\circ 436 \pm 1) - (4^\circ 1907 \pm 2)t - 0111 \times 10^{-4}t^2 + 0053 \cos \omega$$

$$i = (50^\circ 313 \pm 2) - 0014 \sin \omega$$

$$e = (.03624 \pm 2) - (.42 \pm 16) \times 10^{-5}t + .000789 \sin \omega$$

$$M = (.66695 \pm 4) + (14.233687 \pm 4)t + (.529 \pm 3) \times 10^{-5}t^2 - (.88 \pm 4) \times 10^{-7}t^3 \\ - .0031294 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1^\circ 60$.

T (MJD)	ω	Ω	1	e	M	n	$n^{1/2}$	q	N	D	σ
37846.0	185.56 4	318.898 4	50.307 5	.03607 3	.9263 1	14.232915 2	.20E-5 8	6.932677	33	8	.62
37850.0	199.5 4	302.137 4	50.309 4	.03584 7	.859 1	14.232911 1	.55E-5 5	6.934369	38	8	.42
37854.0	212.65 4	285.377 4	50.305 3	.03581 2	.7933 1	14.232907 1	.52E-5 8	6.934562	32	8	.44
37858.0	226.53 6	268.622 4	50.307 2	.03559 4	.7259 2	14.232911 3	.9E-5 1	6.936161	26	8	.88
37862.0	240.47 4	251.862 2	50.308 2	.03550 4	.6585 1	14.232937 2	.88E-5 8	6.936802	22	8	.74
37866.0	254.46 3	235.103 1	50.311 1	.03546 2	.59101 8	14.232985 1	.52E-5 5	6.937090	56	8	.61
37870.0	268.30 4	218.341 1	50.3081 9	.03541 1	.5241 1	14.233024 1	.66E-5 4	6.937409	77	8	.51
37874.0	282.13 3	201.581 1	50.308 1	.03546 1	.45738 9	14.233073 9	.35E-5 5	6.937041	73	8	.60
37878.0	296.14 3	184.819 2	50.307 1	.03552 2	.39006 8	14.233118 1	.45E-5 5	6.936572	72	8	.74
37882.0	310.15 4	168.060 3	50.307 1	.03563 2	.3228 1	14.233179 2	.46E-5 6	6.935761	52	8	.60
37886.0	324.14 4	151.298 3	50.309 1	.03577 2	.2556 1	14.233277 1	.97E-5 5	6.934705	47	8	.48
37890.0	338.0 5	134.531 1	50.315 7	.0361 2	.189 4	14.233389 1	.64E-5 6	6.932435	35	8	.45
37894.0	351.37 8	117.790 9	50.298 8	.03609 4	.1238 2	14.233474 2	.7E-5 1	6.932392	21	8	.72
37898.0	4.97 4	101.023 5	50.299 6	.03631 3	.0580 2	14.233550 2	.33E-5 7	6.930798	24	8	.57
37902.0	18.62 2	84.255 1	50.306 2	.03650 2	.99211 6	14.233622 1	.28E-5 5	6.929403	36	8	.52
37906.0	32.14 2	67.491 1	50.307 1	.03669 2	.92651 6	14.233696 1	.66E-5 5	6.928001	47	8	.57
37910.0	45.62 2	50.721 3	50.310 2	.03683 3	.86109 6	14.233800 1	.116E-4 6	6.926961	36	8	.58
37914.0	59.09 2	33.958 5	50.306 4	.03684 2	.79590 6	14.233906 2	.52E-5 4	6.926831	27	8	.50
37918.0	72.37 3	17.180 6	50.293 5	.03697 3	.73144 8	14.233973 4	.6E-5 2	6.925853	16	8	.56
37922.0	85.67 6	*43.1	50.304 5	.03709 1	.6669 2	14.234029 4	.9E-5 2	6.925036	11	8	.93
37926.0	98.90 3	343.680 4	50.308 2	.03713 3	.6027 1	14.234067 2	.47E-5 7	6.924725	22	8	.35
37930.0	112.2 3	326.908 4	50.314 4	.03706 9	.5382 8	14.234084 1	.37E-5 7	6.925210	30	8	.44
37934.0	125.90 2	310.142 4	50.315 4	.03672 3	.47265 6	14.234106 2	.29E-5 6	6.927660	32	8	.59

Table 4

RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1959 IOTA 1

MJD	Z	Φ	Ψ	D.R.A.	\dot{P}
PERIGEE IN SUNLIGHT					
37846.	554.	-4.3	50.1	43.0	-0.197E-07
37850.	557.	-14.9	48.6	31.3	-0.543E-07
37854.	560.	-24.5	50.8	19.9	-0.513E-07
37858.	564.	-33.9	56.8	10.8	-0.889E-07
37862.	568.	-42.0	63.5	4.5	-0.869E-07
37866.	571.	-47.9	68.5	1.7	-0.513E-07
37870.	572.	-50.3	70.1	1.8	-0.652E-07
37874.	571.	-48.8	67.7	2.4	-0.346E-07
37878.	568.	-43.7	61.6	0.7	-0.444E-07
37882.	565.	-36.0	53.1	355.4	-0.454E-07
37886.	561.	-26.8	44.4	347.2	-0.958E-07
37890.	556.	-16.8	38.7	336.9	-0.632E-07
37894.	554.	-6.6	39.8	325.4	-0.691E-07
37898.	553.	3.8	46.6	313.6	-0.326E-07
37902.	552.	14.2	56.5	302.1	-0.276E-07
37906.	553.	24.2	66.7	291.4	-0.652E-07
37910.	555.	33.4	75.5	282.3	-0.115E-06
37914.	558.	41.3	81.6	275.6	-0.513E-07
37918.	559.	47.2	85.1	272.0	-0.592E-07
37922.	559.	50.1	86.6	271.3	-0.888E-07
37926.	559.	49.5	87.7	271.5	-0.464E-07
37930.	558.	45.4	89.9	270.0	-0.365E-07
37934.	558.	38.6	94.3	265.6	-0.286E-07

Satellite 1960 Xi 1

Joan Weingarten

I. SAO smoothed elements

The following elements are based on 203 observations and are valid for the period July 1 through August 1, 1962.

$$T_o = 37862.0 \text{ MJD}$$

$$\omega = (353^\circ 658 \pm 5) + (2^\circ 8106 \pm 3)t + .3741 \times 10^{-4}t^2 + .3459 \cos \omega$$

$$\Omega = (79^\circ 733 \pm 1) - (3^\circ 3859 \pm 1)t - .9740 \times 10^{-5}t^2 + .0142 \cos \omega$$

$$i = (49^\circ 951 \pm 1) - .6184 \times 10^{-4}t - .0042 \sin \omega$$

$$e = (.11944 \pm 1) - .3080 \times 10^{-5}t + .0007287 \sin \omega$$

$$M = (.28438 \pm 1) + (12.804759 \pm 1)t + (.1324 \pm 2) \times 10^{-4}t^2 - (.40 \pm 3) \times 10^{-7}t^3 \\ - .0008870 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1^\circ 33$.

The following elements are based on 140 observations and are valid for the period August 1 through September 1, 1962.

$$T_o = 37892.0 \text{ MJD}$$

$$\omega = (78^\circ 034 \pm 4) + (2^\circ 8165 \pm 5)t + .0001592t^2 + .3459 \cos \omega$$

$$\Omega = (338^\circ 139 \pm 1) - (3^\circ 3862 \pm 2)t + .812 \times 10^{-6}t^2 + .0142 \cos \omega$$

$$i = (49^\circ 949 \pm 1) + .6842 \times 10^{-4}t - .0042 \sin \omega$$

$$e = (.11936 \pm 1) - .1047 \times 10^{-4}t + .0007287 \sin \omega$$

$$M = (.43670 \pm 1) + (12.805302 \pm 2)t + (.680 \pm 3) \times 10^{-5}t^2 + (.26 \pm 4) \times 10^{-7}t^3 \\ - .0008870 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1^\circ 33$.

The following elements are based on 106 observations and are valid for the period September 1 through October 1, 1962.

$$T_o = 37924.0 \text{ MJD}$$

$$\omega = (168^\circ 035 \pm 7) + (2^\circ 8127 \pm 6)t + .0001592t^2 + .3459 \cos \omega$$

$$\Omega = (229^\circ 774 \pm 2) - (3^\circ 3868 \pm 2)t + .812 \times 10^{-6}t^2 + .0142 \cos \omega$$

$$i = (49^\circ 947 \pm 1) + .6824 \times 10^{-4}t - .0042 \sin \omega$$

$$e = (.11931 \pm 1) - .1047 \times 10^{-4}t + .0007287 \sin \omega$$

$$M = (.21562 \pm 2) + (12.805919 \pm 1)t + (.949 \pm 3) \times 10^{-5}t^2 - (.73 \pm 4) \times 10^{-7}t^3 \\ - .0008870 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1^\circ 40.$

$\frac{t}{(MJD)}$	ω	Ω	i	e	M	n	$n^{1/2}$	q	σ
37848.0	314.53 1	127.147 3	49.952 1	.11892 3	.01993 4	12.804350 2	.6E-5 1.	6.799819	.55 6 .55
37852.0	325.85 2	113.600 7	49.955 4	.11900 4	.23740 6	12.804448 3	.12E-4 1	6.799142	.51 6 .56
37856.0	336.7 2	100.054 9	49.961 6	.1189 2	.4569 7	12.804569 2	.15E-4 1	6.799956	.35 6 .42
37860.0	348.34 3	86.532 9	49.941 9	.11935 4	.67411 7	12.804693 3	.14E-4 2	6.796378	.28 6 .51
37864.0	359.61 2	72.976 4	49.948 6	.11944 4	.89313 7	12.804804 2	.11E-4 1	6.795625	.22 6 .46
37868.0	10.853 7	59.431 2	49.947 2	.11959 2	.11257 2	12.804917 2	.11E-4 1	6.794435	.40 6 .45
37872.0	22.091 6	45.886 2	49.951 2	.11966 2	.33241 2	12.805025 1	.150E-4 8	6.793846	.46 6 .52
37876.0	33.310 7	32.341 2	49.948 2	.11979 3	.55272 2	12.805107 2	.7E-5 1	6.792852	.46 6 .47
37880.0	44.49 1	18.773 7	49.933 5	.11995 5	.77346 4	12.805237 4	.8E-5 2	6.791534	.39 6 .64
37884.0	55.73 1	5.231 4	49.938 4	.12003 3	.99414 2	12.805278 5	.5E-5 2	6.790940	.23 6 .60
37888.0	66.93 1	351.675 7	49.939 6	.12004 4	.21522 3	12.805330 2	.4E-5 2	6.790798	.27 6 1.04
37892.0	78.119 7	338.140 4	49.947 2	.12010 2	.43648 1	12.805374 2	.8E-5 1	6.790363	.23 6 .46
37896.0	89.276 9	324.589 4	49.946 2	.12013 3	.65809 3	12.805456 3	.12E-4 2	6.790051	.30 6 .48
37900.0	100.25 1	311.050 9	49.945 6	.1203 1	.8807 4	12.805524 4	.5E-5 2	6.788516	.27 6 .52
37904.0	111.76 8	297.504 6	49.944 6	.1198 2	.1016 3	12.805559 3	.3E-5 2	6.792587	.24 6 .50
37908.0	122.88 1	283.953 3	49.954 6	.11995 4	.32409 3	12.805622 3	.11E-4 2	6.791399	.22 6 .48
37912.0	134.043 9	270.406 2	49.946 3	.11984 4	.54676 2	12.805695 2	.11E-4 1	6.792277	.28 6 .54
37916.0	145.24 1	256.858 1	49.947 1	.11975 2	.76968 2	12.805780 2	.12E-4 1	6.792915	.32 6 .57
37920.0	156.49 2	243.311 4	49.947 2	.11971 3	.99284 4	12.805864 2	.15E-4 2	6.793171	.22 6 .35
37924.0	167.74 1	229.753 4	49.945 3	.11954 2	.21640 3	12.805928 2	.7E-5 1	6.794495	.24 6 .46
37928.0	178.95 1	216.205 4	49.942 4	.11928 2	.44032 3	12.805987 6	.4E-5 4	6.796459	.17 6 .47
37932.0	190.21 3	202.63 4	49.940 6	.11913 5	.6645 1	12.80602 5	.2E-4 1	6.797612	.10 6 .53
37936.0	201.50 2	189.11 2	49.949 2	.11899 3	.88871 8	12.806115 4	.9E-5 2	6.798685	.17 6 .53

Table 5
RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1960 XI 1

MJD	Z	φ	ψ	D.R.A.	P
PERIGEE IN SUNLIGHT					
37848.	428.	-33.1	56.6	352.4	-0.732E-07
37852.	425.	-25.5	50.4	344.4	-0.146E-06
37856.	424.	-17.6	46.8	334.8	-0.183E-06
37860.	419.	-8.9	45.8	325.2	-0.171E-06
37864.	417.	-0.3	48.9	314.9	-0.134E-06
37868.	416.	8.3	54.7	304.6	-0.134E-06
37872.	417.	16.7	61.8	294.7	-0.183E-06
37876.	418.	24.9	68.7	285.5	-0.854E-07
37880.	419.	32.4	74.6	277.5	-0.976E-07
37884.	421.	39.2	78.9	271.2	-0.610E-07
37888.	423.	44.8	81.5	266.9	-0.488E-07
37892.	424.	48.5	82.8	265.0	-0.976E-07
37896.	424.	49.9	83.7	264.7	-0.146E-06
37900.	422.	48.9	85.2	264.3	-0.610E-07
37904.	425.	45.3	87.6	263.2	-0.366E-07
37908.	422.	40.0	92.6	259.3	-0.134E-06
37912.	420.	33.4	99.7	253.4	-0.134E-06
37916.	419.	25.9	108.9	245.8	-0.146E-06
PERIGEE IN EARTH SHADOW					
37920.	417.	17.8	119.6	237.1	-0.183E-06
37924.	417.	9.4	131.1	227.6	-0.854E-07
37928.	418.	0.8	142.2	217.8	-0.488E-07
37932.	420.	-7.8	150.9	207.9	-0.244E-06
37936.	422.	-16.3	154.1	198.4	-0.110E-06

Satellite 1961 Delta 1

Joan Weingarten

I. SAO smoothed elements

The following elements are based on 242 observations and are valid for the period June 30 through July 15, 1962.

$$T_o = 37853.0 \text{ MJD}$$

$$\omega = (1^{\circ} 422 \pm 7) + (4^{\circ} 809 \pm 1)t + .0001347t^2 + .2838 \cos \omega$$

$$\Omega = (130^{\circ} 835 \pm 1) - (3^{\circ} 6489 \pm 2)t - .6764 \times 10^{-4}t^2 + .0085 \cos \omega$$

$$i = (38^{\circ} 8307 \pm 5) + .0001990t - .0040 \sin \omega$$

$$e = (.106977 \pm 5) + (.84 \pm 13) \times 10^{-5}t + .483 \times 10^{-6}t^2 + .0005253 \sin \omega$$

$$M = (.40249 \pm 2) + (12.206694 \pm 5)t + (.4718 \pm 7) \times 10^{-4}t^2 + (.46 \pm 2) \times 10^{-6}t^3 \\ - .0007344 \cos \omega$$

Standard error of one observation: $\sigma = \pm 0.90$.

The following elements are based on 137 observations and are valid for the period July 15 through July 31, 1962.

$$T_o = 37868.0 \text{ MJD}$$

$$\omega = (73^{\circ} 554 \pm 9) + (4^{\circ} 809 \pm 2)t + .0001347t^2 + .2838 \cos \omega$$

$$\Omega = (76^{\circ} 094 \pm 2) - (3^{\circ} 6507 \pm 3)t - .6764 \times 10^{-4}t^2 + .0085 \cos \omega$$

$$i = (38^{\circ} 832 \pm 1) + .0001990t - .0040 \sin \omega$$

$$e = (.10734 \pm 1) + (.38 \pm 2) \times 10^{-4}t + .483 \times 10^{-6}t^2 + .0005253 \sin \omega$$

$$M = (.51520 \pm 3) + (12.208458 \pm 5)t + (.6960 \pm 8) \times 10^{-4}t^2 + (.35 \pm 2) \times 10^{-6}t^3 \\ - .0007344 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1.23$.

The following elements are based on 173 observations and are valid for the period July 31 through August 15, 1962.

$$T_o = 37884.0 \text{ MJD}$$

$$\omega = (150^\circ 487 \pm 6) + (4^\circ 809 \pm 1)t + .0002979t^2 + .2752 \cos \omega$$

$$\Omega = (17^\circ 661 \pm 1) - (3^\circ 6534 \pm 3)t - .0001019t^2 + .0059 \cos \omega$$

$$i = (38^\circ 8327 \pm 8) + .0002044t - .0040 \sin \omega$$

$$e = (.108015 \pm 9) + (.43 \pm 2) \times 10^{-4}t + .775 \times 10^{-6}t^2 + .0005260 \sin \omega$$

$$M = (.86895 \pm 2) + (12.210770 \pm 4)t + (.7577 \pm 6) \times 10^{-4}t^2 + (.33 \pm 2) \times 10^{-6}t^3 \\ - .0007693 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1.00$.

The following elements are based on 254 observations and are valid for the period August 15 through August 31, 1962.

$$T_o = 37899.0 \text{ MJD}$$

$$\omega = (222^\circ 635 \pm 5) + (4^\circ 8037 \pm 9)t + .0002979t^2 + .2752 \cos \omega$$

$$\Omega = (322^\circ 838 \pm 1) - (3^\circ 6571 \pm 3)t - .0001019t^2 + .0059 \cos \omega$$

$$i = (38^\circ 8350 \pm 5) + .0002044t - .0040 \sin \omega$$

$$e = (.108851 \pm 9) + (.64 \pm 2) \times 10^{-4}t + .775 \times 10^{-6}t^2 + .0005260 \sin \omega$$

$$M = (.05020 \pm 1) + (12.213635 \pm 3)t + (.00010501 \pm 6)t^2 - (.31 \pm 1) \times 10^{-6}t^3 \\ - .0007693 \cos \omega$$

Standard error of one observation: $\sigma = \pm 0.95$.

The following elements are based on 277 observations and are valid for the period August 31 through September 15, 1962.

$$T_o = 37915.0 \text{ MJD}$$

$$\omega = (299^\circ 476 \pm 6) + (4^\circ 801 \pm 1)t + .0002979t^2 + .2752 \cos \omega$$

$$\Omega = (264^\circ 297 \pm 1) - (3^\circ 6603 \pm 3)t - .0001019t^2 + .0059 \cos \omega$$

$$i = (38^\circ 8393 \pm 6) + .0002044t - .0040 \sin \omega$$

$$e = (.10982 \pm 1) + (.51 \pm 3) \times 10^{-4}t + .775 \times 10^{-6}t^2 + .0005260 \sin \omega$$

$$M = (.49504 \pm 2) + (12.216986 \pm 4)t + (.00010264 \pm 8)t^2 - (.78 \pm 18) \times 10^{-7}t^3 \\ - .0007693 \cos \omega$$

Standard error of one observation: $\sigma = \pm 1.13$.

The following elements are based on 258 observations and are valid for the period September 15 through September 30, 1962.

$$T_o = 37930.0 \text{ MJD}$$

$$\omega = (11^\circ 700 \pm 5) + (4^\circ 818 \pm 1)t + .0002979t^2 + .2752 \cos \omega$$

$$\Omega = (209^\circ 371 \pm 1) - (3^\circ 6631 \pm 2)t - .0001019t^2 + .0059 \cos \omega$$

$$i = (38^\circ 8401 \pm 5) + .0002044t - .0040 \sin \omega$$

$$e = (.110463 \pm 9) + (.51 \pm 2) \times 10^{-4}t + .775 \times 10^{-6}t^2 + .0005260 \sin \omega$$

$$M = (.77398 \pm 1) + (12.220371 \pm 3)t + (.00012744 \pm 6)t^2 + (.79 \pm 1) \times 10^{-6}t^3 \\ - .0007693 \cos \omega$$

Standard error of one observation: $\sigma = \pm 0.80$.

II. SAO mean elements -- Satellite 1961 Delta 1

1-31 July 1962

T (MJD)	w	Ω	i	e	M	n	n'2	q	N	D	σ
37846.0	327.94 2	156.374 4	38.834 2	.10667 2	.95742 7	12.206088 6	*3E-4 1	7.117094	41	2	.41
37847.0	332.76 2	152.727 3	38.835 1	.10670 1	.16351 5	12.206147 5	*1.8E-4 9	7.116890	37	2	.31
37848.0	337.64 2	149.083 4	38.831 2	.10677 2	.36949 6	12.206216 5	*5E-4 1	7.116305	30	2	.39
37849.0	342.51 3	145.446 4	38.826 2	.10687 3	.5755 1	12.206302 9	*7E-4 2	7.115455	30	2	.52
37850.0	347.24 3	141.795 4	38.831 2	.10681 2	.7822 1	12.206402 6	*5E-4 1	7.115908	29	2	.33
37851.0	351.95 3	138.143 4	38.832 2	.10682 2	.9890 1	12.206480 7	*5E-4 1	7.115817	30	2	.40
37852.0	356.90 2	134.495 3	38.831 1	.10691 1	.19510 7	12.206592 5	*5E-4 1	7.115002	35	2	.37
37853.0	1.72 2	130.848 3	38.832 1	.10701 1	.40170 6	12.206689 5	*44E-4 9	7.114195	35	2	.35
37854.0	6.52 3	127.194 4	38.830 1	.10707 2	.60850 8	12.206801 6	*4E-4 1	7.113643	32	2	.45
37855.0	11.37 3	123.542 4	38.830 2	.10712 2	.81519 8	12.206905 8	*4E-4 1	7.113222	31	2	.40
37856.0	16.17 2	119.896 3	38.826 1	.10714 2	.02217 7	12.207013 6	*44E-4 9	7.113043	31	2	.34
37857.0	20.92 3	116.244 3	38.830 1	.10719 2	.22940 8	12.207094 6	*3E-4 1	7.112582	33	2	.39
37858.0	25.73 3	112.591 4	38.834 2	.10730 2	.43650 7	12.207214 6	*8E-4 1	7.111663	29	2	.41
37859.0	30.52 3	108.944 5	38.833 2	.10733 2	.64384 8	12.207343 9	*5E-4 1	7.111360	30	2	.54
37860.0	35.33 2	105.295 4	38.830 2	.10738 2	.85120 6	12.207453 6	*5E-4 1	7.110959	27	2	.40
37861.0	40.13 2	101.646 5	38.830 2	.10746 2	.05870 7	12.207579 6	*7E-4 1	7.110294	22	2	.42
37862.0	44.92 3	98.004 5	38.831 2	.10753 2	.26631 8	12.207701 7	*6E-4 1	7.109619	25	2	.46
37863.0	49.71 3	94.353 5	38.833 2	.10759 3	.47410 8	12.207816 8	*5E-4 1	7.109163	23	2	.46
37864.0	54.42 2	90.710 5	38.828 2	.10756 2	.68220 6	12.207968 7	*10E-3 1	7.109282	17	2	.35
37865.0	59.26 2	87.052 4	38.826 2	.10764 2	.89011 6	12.208071	*5E-4 2	7.108616	16	2	.36
37866.0	64.11 3	83.387 5	38.834 3	.10775 3	.09812 7	12.208241	*8E-4 2	7.107693	19	2	.50
37867.0	68.91 3	79.750 8	38.829 4	.10783 4	.3064 1	12.208362	*6E-4 3	7.107000	17	2	.64
37868.0	73.62 4	76.10 1	38.820 5	.10785 6	.5150 1	12.208512	*9E-4 3	7.106807	17	2	.79
37869.0	78.35 4	72.443 9	38.822 4	.10784 5	.7238 1	12.208662	*9E-4 2	7.106803	18	2	.66
37870.0	83.22 4	68.804 9	38.825 4	.10794 4	.9322 1	12.208821	*2E-4 3	7.105939	17	2	.49
37871.0	88.04 2	65.143 3	38.831 2	.10804 2	.14101 5	12.208984 5	*88E-4 9	7.105077	18	2	.29
37872.0	92.81 2	61.493 4	38.826 3	.10804 3	.35009 7	12.209151	*9E-4 1	7.105017	14	2	.39
37873.0	97.61 7	57.83 1	38.830 7	.10812 9	.5592 2	12.209323	*9E-4 5	7.104335	13	2	.89
37874.0	102.39 4	54.183 5	38.829 5	.10816 6	.7686 1	12.209451	*4E-4 2	7.103974	15	2	.64
37875.0	107.14 2	50.532 3	38.829 3	.10813 3	.97815 6	12.209562 6	*7E-4 1	7.104147	18	2	.42
37876.0	111.92 2	46.880 2	38.832 2	.10816 2	.18777 5	12.209707 6	*56E-4 9	7.103835	24	2	.37

SAO mean elements -- Satellite 1961 Delta 1

1-31 August 1962

T (MJD)	w	Ω	i	e	M	n	n' /2	q	N	D	σ
37877.0	116.69 2	43.2229 3	38.832 2	.010813 3	.39758 5	12.209834 6	.7E-4 1	7.104064	24	2	.40
37878.0	121.49 2	39.579 4	38.828 3	.010820 4	.60740 7	12.209962 9	.11E-3 2	7.103443	23	2	.54
37879.0	126.30 2	35.921 3	38.823 2	.010829 3	.81735 5	12.210116 7	.5E-4 1	7.102662	21	2	.42
37880.0	131.07 2	32.268 2	38.828 2	.010825 2	.02757 4	12.210252 6	.80E-4 9	7.102915	33	2	.38
37881.0	135.86 2	28.617 2	38.831 2	.010825 2	.23789 5	12.210395 5	.68E-4 9	7.102885	36	2	.40
37882.0	140.68 2	24.963 4	38.828 3	.010830 3	.44825 6	12.21053 1	.8E-4 1	7.102440	22	2	.44
37883.0	145.50 3	21.308 4	38.825 3	.010834 4	.65874 8	12.210694 8	.9E-4 2	7.102071	20	2	.53
37884.0	150.31 3	17.657 5	38.827 4	.010834 4	.86943 8	12.21082 1	.4E-4 2	7.102025	21	2	.59
37885.0	155.05 2	14.006 4	38.835 3	.010825 3	.08048 6	12.210975 6	.5E-4 1	7.102615	23	2	.43
37886.0	159.82 2	10.347 4	38.835 2	.010822 3	.29160 6	12.211125 5	.9E-4 1	7.102800	23	2	.38
37887.0	164.66 3	6.691 6	38.831 3	.010825 4	.5027 1	12.21128 1	.7E-4 1	7.102544	21	2	.52
37888.0	169.45 3	3.038 7	38.833 3	.010822 5	.71407 8	12.211427 8	.7E-4 2	7.102731	20	2	.54
37889.0	174.24 2	359.383 6	38.833 3	.010821 4	.92559 6	12.21157 1	.13E-3 2	7.102722	19	2	.42
37890.0	178.98 3	355.734 8	38.845 4	.010814 4	.13742 8	12.21172 1	.8E-4 2	7.103212	18	2	.53
37891.0	183.88 2	352.080 5	38.836 2	.010832 3	.34896 5	12.211898 6	.13E-3 1	7.101705	18	2	.31
37892.0	188.71 2	348.425 5	38.834 2	.010836 3	.56090 5	12.212100 6	.10E-3 1	7.101351	27	2	.41
37893.0	193.53 2	344.772 4	38.836 2	.010835 3	.77306 5	12.212311 6	.12E-3 1	7.101342	33	2	.40
37894.0	198.34 2	341.118 3	38.838 2	.010835 3	.98550 4	12.212527 6	.8E-4 1	7.101213	29	2	.33
37895.0	203.16 2	337.456 4	38.835 2	.010840 3	.19813 6	12.21273 1	.8E-4 2	7.100770	19	2	.31
37896.0	207.98 2	333.797 4	38.833 2	.010849 4	.41099 6	12.21293 1	.7E-4 3	7.100000	19	2	.28
37897.0	212.80 2	330.150 5	38.835 2	.010845 4	.62402 5	12.21314 1	.12E-3 2	7.100216	23	2	.44
37898.0	217.62 2	326.491 5	38.836 2	.010847 3	.83727 5	12.213324 8	.17E-3 2	7.100013	21	2	.38
37899.0	222.46 2	322.832 5	38.836 1	.010851 4	.05066 6	12.213547 5	.13E-3 1	7.099615	25	2	.39
37900.0	227.25 2	319.182 4	38.839 1	.010851 3	.26446 5	12.213765 6	.103E-3 8	7.099530	37	2	.44
37901.0	232.08 1	315.520 3	38.840 1	.010855 2	.47832 3	12.213991 5	.108E-3 9	7.099111	41	2	.38
37902.0	236.90 1	311.860 3	38.838 1	.010861 3	.69245 4	12.214196 7	.10E-3 1	7.098561	31	2	.36
37903.0	241.76 1	308.210 3	38.840 1	.010875 3	.90664 4	12.214380 5	.83E-4 9	7.097307	33	2	.37
37904.0	246.58 1	304.549 2	38.841 1	.010877 2	.12117 3	12.214573 4	.95E-4 6	7.097115	41	2	.34
37905.0	251.383 8	300.890 2	38.8403 8	.010878 2	.33596 3	12.214772 4	.91E-4 6	7.096984	41	2	.29
37906.0	256.215 9	297.233 4	38.8418 9	.010887 3	.55084 3	12.214941 4	.93E-4 7	7.096203	37	2	.28
37907.0	261.02 2	293.565 5	38.839 1	.010886 4	.76604 5	12.215167 6	.9E-4 1	7.096165	43	2	.39

Table 6

RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1961 DELTA 1

MJD	Z	ϕ	ψ	D.R.A.	\dot{P}
PERIGEE IN SUNLIGHT					
37846.	741.	-19.4	52.2	30.9	-0.403E-06
37847.	740.	-16.7	49.6	30.4	-0.242E-06
37848.	739.	-13.8	47.0	29.8	-0.671E-06
37849.	738.	-10.9	44.2	29.1	-0.940E-06
37850.	738.	-8.0	41.4	28.2	-0.671E-06
37851.	738.	-5.0	38.5	27.2	-0.671E-06
37852.	737.	-1.9	35.6	26.4	-0.671E-06
37853.	736.	1.1	32.8	25.5	-0.591E-06
37854.	735.	4.1	30.1	24.6	-0.537E-06
37855.	735.	7.1	27.5	23.7	-0.537E-06
37856.	735.	10.1	25.1	22.9	-0.591E-06
37857.	735.	12.9	22.9	22.1	-0.403E-06
37858.	735.	15.8	21.1	21.4	-0.107E-05
37859.	735.	18.6	19.8	20.8	-0.671E-06
37860.	735.	21.3	19.0	20.4	-0.671E-06
37861.	735.	23.8	18.7	20.1	-0.939E-06
37862.	735.	26.3	18.9	20.0	-0.805E-06
37863.	736.	28.6	19.6	20.1	-0.671E-06
37864.	736.	30.7	20.6	20.3	-0.134E-05
37865.	736.	32.6	22.0	20.8	-0.671E-06
37866.	736.	34.3	23.5	21.6	-0.107E-05
37867.	736.	35.8	25.0	22.6	-0.805E-06
37868.	736.	37.0	26.5	23.6	-0.121E-05
37869.	737.	37.9	27.9	24.8	-0.121E-05
37870.	736.	38.5	29.4	26.3	-0.268E-06

Table 6 (cont.)

RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1961 DELTA 1

MJD	Z	φ	ψ	D.R.A.	\dot{P}
37871.	735.	38.8	30.7	27.8	-0.118E-05
37872.	735.	38.8	31.9	29.3	-0.121E-05
37873.	734.	38.4	32.9	30.8	-0.121E-05
37874.	734.	37.8	33.7	32.2	-0.537E-06
37875.	733.	36.8	34.4	33.4	-0.939E-06
37876.	733.	35.6	34.9	34.5	-0.751E-06
37877.	732.	34.1	35.2	35.4	-0.939E-06
37878.	731.	32.3	35.5	36.1	-0.148E-05
37879.	730.	30.3	35.5	36.6	-0.671E-06
37880.	729.	28.2	35.5	36.9	-0.107E-05
37881.	729.	25.9	35.3	37.0	-0.912E-06
37882.	727.	23.4	35.1	36.9	-0.107E-05
37883.	726.	20.8	34.9	36.6	-0.121E-05
37884.	726.	18.1	34.6	36.3	-0.537E-06
37885.	726.	15.3	34.3	35.7	-0.671E-06
37886.	725.	12.5	34.1	35.0	-0.121E-05
37887.	725.	9.5	34.0	34.3	-0.939E-06
37888.	725.	6.6	34.0	33.5	-0.939E-06
37889.	724.	3.6	34.1	32.7	-0.174E-05
37890.	725.	0.6	34.4	31.8	-0.107E-05
37891.	723.	-2.4	35.0	31.0	-0.174E-05
37892.	723.	-5.4	35.7	30.2	-0.134E-05
37893.	723.	-8.4	36.6	29.4	-0.161E-05
37894.	724.	-11.4	37.7	28.7	-0.107E-05
37895.	724.	-14.3	39.0	28.1	-0.107E-05
37896.	723.	-17.1	40.3	27.5	-0.939E-06

Table 6 (cont.)

RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1961 DELTA 1

MJD	Z	φ	ψ	D.R.A.	\dot{P}
37897.	724.	-19.9	41.8	27.1	-0.161E-05
37898.	725.	-22.5	43.4	26.9	-0.228E-05
37899.	725.	-25.0	45.1	26.8	-0.174E-05
37900.	726.	-27.4	46.7	26.9	-0.138E-05
37901.	726.	-29.7	48.4	27.2	-0.145E-05
37902.	726.	-31.7	50.0	27.7	-0.134E-05
37903.	725.	-33.5	51.5	28.4	-0.111E-05
37904.	726.	-35.1	53.0	29.4	-0.127E-05
37905.	726.	-36.5	54.3	30.5	-0.122E-05
37906.	726.	-37.5	55.5	31.8	-0.125E-05
37907.	726.	-38.3	56.4	33.3	-0.121E-05
37908.	726.	-38.7	57.3	34.8	-0.188E-05
37909.	726.	-38.8	57.9	36.5	-0.134E-05
37910.	725.	-38.6	58.4	38.1	-0.188E-05
37911.	723.	-38.1	58.6	39.6	-0.157E-05
37912.	723.	-37.3	58.6	41.1	-0.134E-05
37913.	722.	-36.1	58.4	42.3	-0.131E-05
37914.	720.	-34.7	58.0	43.5	-0.158E-05
37915.	720.	-33.0	57.3	44.3	-0.133E-05
37916.	718.	-31.1	56.5	45.0	-0.134E-05
37917.	716.	-29.0	55.5	45.5	-0.134E-05
37918.	715.	-26.8	54.4	45.8	-0.122E-05
37919.	714.	-24.3	53.1	45.8	-0.153E-05
37920.	713.	-21.8	51.6	45.7	-0.174E-05
37921.	712.	-19.1	50.1	45.4	-0.161E-05
37922.	711.	-16.3	48.6	45.0	-0.153E-05

Table 6 (cont.)

RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1961 DELTA 1

MJD	Z	φ	ψ	D.R.A.	\dot{P}
37923.	709.	-13.5	47.0	44.5	-0.173E-05
37924.	707.	-10.5	45.6	43.9	-0.155E-05
37925.	706.	-7.6	44.1	43.2	-0.166E-05
37926.	705.	-4.5	42.9	42.4	-0.871E-06
37927.	705.	-1.5	41.7	41.6	-0.174E-05
37928.	704.	1.5	40.8	40.8	-0.201E-05
37929.	703.	4.5	40.1	40.0	-0.134E-05
37930.	703.	7.5	39.8	39.2	-0.161E-05
37931.	702.	10.4	39.7	38.5	-0.228E-05
37932.	701.	13.4	40.0	37.9	-0.187E-05
37933.	701.	16.2	40.6	37.3	-0.161E-05
37934.	700.	19.0	41.5	36.9	-0.197E-05
37935.	700.	21.6	42.7	36.6	-0.193E-05
37936.	701.	24.2	44.1	36.4	-0.214E-05
37937.	700.	26.6	45.7	36.4	-0.228E-05

000 mean elements -- Satellite 1961 Delta 1

T (MD)	ω	Ω	i	e	M	n	n'/2	q	N	D	σ
37908.0	265.83 1	289.911 5	38.840 1	.10888 3	.98138 4	12.215354 6	.14E-3 1	7.095937	42	2	.39
37909.0	270.67 1	286.258 6	38.841 2	.10891 4	.19687 4	12.215600 7	.10E-3 1	7.095593	36	2	.42
37910.0	275.495 9	282.594 6	38.841 1	.10896 4	.41262 3	12.215808 5	.14E-3 1	7.095079	36	2	.37
37911.0	280.33 1	278.936 3	38.845 1	.10916 3	.62857 3	12.216022 5	.117E-3 9	7.093422	29	2	.33
37912.0	285.15 2	275.279 4	38.846 2	.10920 5	.84478 7	12.216246 8	.10E-3 1	7.093037	23	2	.42
37913.0	289.96 2	271.617 3	38.844 2	.10923 4	.06125 6	12.216466 6	.98E-4 9	7.092698	24	2	.43
37914.0	294.81 2	267.954 2	38.844 2	.10934 3	.27780 5	12.216666 6	.118E-3 9	7.091747	24	2	.37
37915.0	299.61 2	264.303 2	38.843 1	.10935 4	.49469 6	12.216865 5	.99E-4 9	7.091942	34	2	.34
37916.0	304.45 2	260.643 2	38.843 1	.10948 4	.71164 .6	12.217066 5	.10E-3 1	7.090528	44	2	.41
37917.0	309.29 2	256.979 2	38.841 1	.10959 3	.92882 6	12.217264 5	.100E-3 9	7.089572	42	2	.44
37918.0	314.11 1	253.318 2	38.841 1	.10963 2	.14627 4	12.217461 4	.91E-4 8	7.089110	45	2	.34
37919.0	318.95 1	249.658 2	38.842 1	.10971 2	.36383 4	12.217659 4	.114E-3 7	7.088434	42	2	.28
37920.0	323.74 2	246.001 3	38.841 1	.10974 4	.58176 7	12.217924 5	.13E-3 1	7.088085	37	2	.36
37921.0	328.55 2	242.338 3	38.846 2	.10978 3	.79991 5	12.218150 6	.12E-3 1	7.087681	44	2	.36
37922.0	333.34 1	238.680 3	38.847 1	.10979 2	.01832 4	12.218387 4	.114E-3 7	7.087513	51	2	.34
37923.0	338.199 9	235.017 2	38.8451 9	.10992 1	.23676 3	12.218631 2	.129E-3 5	7.086391	36	2	.21
37924.0	343.07 1	231.351 3	38.842 1	.11008 2	.45541 3	12.218859 3	.116E-3 5	7.084987	28	2	.19
37925.0	347.90 1	227.694 3	38.838 1	.11015 2	.67440 4	12.219105 3	.124E-3 6	7.084336	34	2	.21
37926.0	352.74 1	224.035 3	38.839 1	.11025 2	.89360 4	12.219298 4	.65E-4 8	7.083494	42	2	.23
37927.0	357.53 1	220.372 4	38.842 1	.11029 2	.11318 5	12.219579 4	.13E-3 1	7.083066	38	2	.27
37928.0	2.34 1	216.699 4	38.839 1	.11035 3	.33299 5	12.219824 5	.15E-3 1	7.082479	36	2	.36
37929.0	7.17 2	213.036 4	38.836 2	.11050 3	.55293 6	12.220076 6	.10E-3 1	7.081197	30	2	.40
37930.0	11.99 3	209.378 6	38.836 3	.11056 4	.77319 8	12.220352 8	.12E-3 2	7.080615	21	2	.47
37931.0	16.78 1	205.712 4	38.837 2	.11063 2	.99375 4	12.220591 6	.17E-3 1	7.080008	26	2	.28
37932.0	21.62 1	202.051 3	38.838 1	.11081 2	.21445 4	12.220876 6	.14E-3 1	7.078432	30	2	.22
37933.0	26.42 1	198.395 3	38.839 2	.11092 3	.43549 4	12.221118 6	.12E-3 1	7.077491	32	2	.30
37934.0	31.23 1	194.725 3	38.838 1	.11102 2	.65681 3	12.221413 4	.147E-3 8	7.076511	37	2	.32
37935.0	36.022 9	191.058 3	38.837 7	.11112 2	.87846 3	12.221700 3	.144E-3 5	7.075613	34	2	.25
37936.0	40.80 2	187.391 4	38.840 1	.11114 3	.10044 4	12.221993 7	.16E-3 1	7.075338	31	2	.40
37937.0	45.63 2	183.718 5	38.839 2	.11128 4	.32258 5	12.222298 8	.17E-3 2	7.074128	29	2	.43

T (MJD)	ω	Ω	i	e	M	n	n ^{1/2}	q	N	D	σ
37785.0	258.4 *	63.715 4	47.205 2	.00549 4	.9091+ 1	12.384361 8	•2E-5 9	7.847615	58	2	.67
37786.0	261.7 *	60.498 4	47.203 2	.00472 4	.293555 9	12.384389 7	-•2E-4 1	7.853685	56	2	.58
37787.0	265.0 *	57.284 5	47.200 2	.00401 5	.67798 1	12.38448 1	•8E-4 2	7.859238	51	2	.76
37788.0	268.3 *	54.074 8	47.200 3	.00329 7	.06254 2	12.38457 1	•3E-4 2	7.864855	42	2	.90
37789.0	271.6 *	50.856 9	47.199 3	.00246 9	.44709 2	12.38455 1	.1E-4 2	7.871477	38	2	.99
37790.0	274.9 *	47.64 1	47.189 4	.00170 8	.83165 2	12.38458 1	•3E-4 2	7.877461	48	2	1.02
37791.0	278.2 *	44.430 9	47.182 4	.00099 8	.21628 2	12.38464 2	•4E-5 9	7.883020	50	2	.92
37792.0	281.5 *	41.22 1	47.178 7	.00023 *	.60108 4	12.3843 2	•6E-3 2	7.889137	29	2	.97
37793.0	104.8 *	37.98 2	47.18 1	.0008 1	.48582 5	12.3847 2	•3E-3 3	7.884805	22	2	1.08
37794.0	108.1 *	34.77 1	47.182 7	.00147 8	.87068 2	12.38489 1	•2E-4 2	7.879122	43	2	.88
37795.0	111.4 *	31.57 1	47.175 8	.00206 5	.25560 2	12.385008 7	•8E-4 1	7.874389	33	2	.46
37796.0	114.7 *	28.345 8	47.184 5	.00281 6	.64071 2	12.38513 1	•5E-4 2	7.868449	36	2	.64
37797.0	118.0 *	25.126 8	47.186 5	.00349 6	.02591 2	12.38520 2	•4E-4 4	7.862997	33	2	.63
37798.0	121.3 *	21.911 6	47.182 4	.00416 5	.41121 1	12.385408 8	•13E-3 1	7.857651	26	2	.40
37799.0	124.7 2	18.692 6	47.188 4	.00497 5	.7965 5	12.386155 8	.7E-4 1	7.851382	32	2	.45
37800.0	127.7 2	15.466 7	47.197 4	.00570 5	.1830 5	12.385334 9	•12E-3 2	7.845507	29	2	.50
37801.0	131.0 2	12.254 7	47.194 5	.00635 5	.5688 4	12.38556 1	•11E-3 2	7.840283	22	2	.50
37802.0	134.4 1	9.049 5	47.189 4	.00703 4	.9458 3	12.38573 2	•4E-4 3	7.834852	25	2	.42
37803.0	137.7 1	5.828 6	47.200 5	.00785 6	.3411 4	12.38606 1	•17E-3 3	7.828305	20	2	.45
37804.0	140.6 3	2.61 1	47.20 1	.0084 2	.7289 8	12.3864 1	•3E-3 1	7.823630	11	2	.72
37805.0	143.5 3	359.400 6	47.199 5	.00928 7	.1167 7	12.38657 1	•12E-3 2	7.816798	12	2	.47
37806.0	146.7 1	356.194 4	47.195 3	.00982 6	.5041 3	12.386871 8	•17E-3 2	7.812403	19	2	.34
37807.0	150.20 8	352.984 3	47.197 4	.01056 4	.8912 2	12.387213 6	•17E-3 1	7.806404	25	2	.49
37808.0	153.69 8	349.769 3	47.202 4	.01126 5	.2785 2	12.387535 8	•16E-3 2	7.800706	22	2	.50
37809.0	157.42 7	346.550 2	47.207 2	.01191 4	.6655 2	12.387914 9	•15E-3 2	7.795468	11	2	.29
37810.0	160.6 1	343.345 4	47.203 5	.01264 8	.0544 4	12.38819 1	•19E-3 2	7.789584	12	2	.57
37811.0	164.14 8	340.131 3	47.198 3	.01331 4	.4425 2	12.38857 1	•19E-3 2	7.784158	18	2	.47
37812.0	167.66 5	336.915 2	47.201 2	.01395 3	.8311 1	12.388956 5	•19E-3 8	7.778962	18	2	.35
37813.0	171.17 7	333.700 3	47.206 3	.01452 5	.2202 2	12.38936 1	•20E-3 2	7.774296	15	2	.52
37814.0	174.8 1	330.484 3	47.204 4	.01513 7	.6092 4	12.38971 1	•17E-3 3	7.769337	13	2	.54
37815.0	178.54 6	327.274 2	47.198 2	.01582 4	.9984 2	12.390103 7	•18E-3 1	7.763686	20	2	.40

*Values assumed due to rapidly changing small eccentricity.

T (MJD)	ω	Ω	i	e	M	n	n ^{1/2}	q	N	D	σ
37816.0	182.00 5	324.054 2	47.200 2	.01644 4	.3888 2	12.390470 7	.19E-3 1	7.758614	19	2	.38
37817.0	185.80 5	320.833 2	47.200 3	.01722 4	.7785 2	12.390878 6	.192E-9 9	7.752361	22	2	.37
37818.0	189.41 4	317.620 3	47.201 3	.01789 4	.1693 1	12.391241 5	.165E-3 8	7.746913	24	2	.38
37819.0	192.98 7	314.402 5	47.199 4	.01853 6	.5604 2	12.39161 1	.21E-3 2	7.741708	18	2	.45
37820.0	196.69 6	311.186 5	47.190 4	.01921 4	.9516 2	12.392012 6	.16E-3 1	7.736141	15	2	.32
37821.0	200.39 8	307.972 7	47.196 5	.01987 5	.3432 2	12.39242 2	.21E-3 3	7.730789	13	2	.41
37822.0	204.08 7	304.736 9	47.194 6	.02051 7	.7353 2	12.39282 1	.20E-3 2	7.725595	10	2	.47
37823.0	207.7 2	301.53 2	47.21 2	.0208 3	.1280 6	12.39325 4	.28E-3 6	7.723028	10	2	1.38
37824.0	211.47 6	298.293 6	47.184 6	.02184 8	.5206 2	12.39372 1	.10E-3 2	7.714737	13	2	.54
37825.0	214.9 1	295.08 1	47.18 1	.0226 2	.9146 3	12.39404 2	.26E-3 3	7.708240	14	2	.89
37826.0	218.22 9	291.857 9	47.19 1	.0232 1	.3093 3	12.39455 1	.20E-3 2	7.704013	14	2	.70
37827.0	221.81 4	288.628 4	47.195 4	.02369 6	.7038 1	12.394975 8	.21E-3 1	7.699575	13	2	.28
37828.0	225.45 4	285.397 5	47.188 4	.02457 5	.0985 1	12.395409 7	.25E-3 1	7.692499	18	2	.33
37829.0	228.90 4	282.180 5	47.196 4	.02528 4	.4943 1	12.395866 7	.21E-3 1	7.686701	25	2	.36
37830.0	231.99 5	278.934 7	47.185 6	.02617 5	.8916 2	12.397845 8	.195E-3 4	7.678874	33	2	.51
37831.0	235.73 9	275.73 1	47.20 1	.02679 9	.2873 3	12.39824 1	.21E-3 2	7.673813	11	2	.57
37832.0	237.4 7	272.51 1	47.206 9	.02724 9	.690 2	12.398663 9	.23E-3 2	7.670108	23	2	.39
37833.0	242.70 5	269.259 7	47.194 5	.02815 4	.0819 1	12.399055 6	.21E-3 1	7.662743	35	2	.36
37834.0	245.74 3	266.030 6	47.198 4	.02887 3	.4812 1	12.399457 4	.213E-3 7	7.656903	30	2	.27
37835.0	249.25 4	262.798 5	47.199 3	.02950 4	.8796 1	12.399862 6	.20E-3 1	7.651775	36	2	.47
37836.0	252.46 4	259.572 7	47.202 3	.03017 4	.2793 1	12.400280 7	.22E-3 1	7.646282	42	2	.48
37837.0	255.81 4	256.340 6	47.206 3	.03091 5	.6791 1	12.400699 8	.21E-3 1	7.640277	36	2	.49
37838.0	259.12 2	253.120 4	47.215 2	.03154 4	.0795 7	12.401117 6	.191E-3 9	7.635167	40	2	.45
37839.0	262.34 2	249.881 3	47.218 1	.03221 3	.4807 5	12.401547 5	.228E-3 9	7.629695	44	2	.37
37840.0	265.57 2	246.642 3	47.221 1	.03294 3	.8824 5	12.401947 6	.17E-3 1	7.623795	33	2	.37
37841.0	268.77 2	243.414 3	47.227 2	.03358 4	.2846 7	12.402323 6	.19E-3 1	7.618565	54	2	.52
37842.0	271.98 2	240.180 2	47.233 1	.03419 3	.6872 5	12.402715 5	.198E-3 9	7.613642	62	2	.43
37843.0	275.18 1	236.942 2	47.238 1	.03479 3	.0903 4	12.403110 4	.198E-3 7	7.608713	59	2	.34
37844.0	278.43 2	233.711 2	47.242 1	.03547 3	.4937 5	12.403496 5	.172E-3 9	7.603239	54	2	.41
37845.0	281.64 2	230.480 2	47.250 2	.03612 3	.8977 6	12.403822 6	.157E-3 9	7.597922	49	2	.45

T (MJD)	ω	Ω	i	e	M	n	$n'/2$	q	N	D	σ
37846.0	284.88 2	227.265 2	47.260 2	.03674 3	.30187 6	12.404073 5	.0102E-3 8	7.592992	58	2	.42
37847.0	288.11 3	224.039 3	47.265 2	.03722 4	.70643 8	12.404225 6	.070E-4 9	7.58099	48	2	.44
37848.0	291.40 2	220.769 2	47.244 2	.03767 3	.11108 6	12.404354 4	.071E-4 7	7.585547	42	2	.32
37849.0	294.49 3	217.542 2	47.253 2	.03826 3	.51632 9	12.404449 1	.013E-3 2	7.580840	53	2	.37
37850.0	297.89 2	214.306 2	47.253 2	.03868 3	.92093 7	12.404563 4	.067E-4 7	7.577476	52	2	.40
37851.0	301.28 2	211.067 2	47.253 1	.03915 2	.32576 5	12.404690 3	.068E-4 6	7.573751	49	2	.33
37852.0	304.72 2	207.831 2	47.255 1	.03957 2	.73063 5	12.404804 3	.052E-4 5	7.570376	59	2	.30
37853.0	308.02 2	204.595 2	47.256 1	.03986 2	.13611 7	12.404922 4	.046E-4 6	7.567986	65	2	.35
37854.0	311.49 4	201.360 3	47.257 2	.04016 4	.5413 1	12.405025 7	.06E-4 1	7.565596	53	2	.52
37855.0	314.84 5	198.120 4	47.258 2	.04039 3	.9470 2	12.405172 6	.06E-4 1	7.563771	41	2	.55
37856.0	318.48 4	194.889 3	47.257 1	.04067 2	.3521 1	12.405275 5	.076E-4 7	7.561517	51	2	.46
37857.0	322.10 3	191.652 2	47.258 1	.04094 2	.75738 8	12.405424 4	.067E-4 7	7.559289	54	2	.43
37858.0	325.75 3	188.408 3	47.266 2	.04117 2	.1628 1	12.405555 6	.05E-4 1	7.557423	45	2	.47
37859.0	329.25 4	185.170 3	47.267 2	.04123 3	.5689 1	12.405684 7	.08E-4 1	7.556897	46	2	.48
37860.0	333.03 5	181.941 3	47.263 2	.04148 3	.9744 1	12.405837 5	.07E-4 1	7.554861	45	2	.50
37861.0	336.80 5	178.705 4	47.267 3	.04157 3	.3801 2	12.405972 7	.06E-4 1	7.554091	47	2	.68
37862.0	340.64 3	175.464 2	47.272 2	.04174 2	.78580 9	12.406091 4	.055E-4 8	7.552770	45	2	.38
37863.0	344.54 5	172.227 2	47.273 2	.04189 2	.1915 1	12.406246 5	.064E-4 9	7.551483	51	2	.43
37864.0	348.50 7	168.991 3	47.273 3	.04205 2	.5973 2	12.406054 9	.016E-3 2	7.550273	44	2	.58
37865.0	352.63 7	165.757 3	47.274 2	.04223 2	.0027 2	12.406246 7	.08E-4 1	7.548771	43	2	.51
37866.0	356.46 5	162.522 3	47.275 2	.04233 2	.4093 1	12.406531 7	.014E-3 1	7.547873	47	2	.42
37867.0	.32 4	159.287 3	47.270 2	.04233 2	.8162 1	12.406784 5	.013E-3 1	7.547797	40	2	.39
37868.0	4.39 5	156.052 3	47.263 1	.04258 2	.2226 1	12.407109 6	.0105E-3 9	7.545721	52	2	.43
37869.0	8.31 5	152.812 3	47.255 1	.04278 2	.6297 2	12.407381 5	.0126E-3 9	7.543995	61	2	.60
37870.0	12.25 7	149.571 4	47.252 2	.04295 2	.0371 2	12.407703 8	.011E-3 1	7.542564	50	2	.67
37871.0	16.21 6	146.338 3	47.254 2	.04317 2	.4447.2	12.408014 7	.015E-3 1	7.540678	46	2	.53
37872.0	20.19 5	143.100 3	47.251 2	.04346 2	.8526 1	12.408365 6	.015E-3 1	7.538269	37	2	.36
37873.0	24.13 5	139.850 4	47.250 1	.04358 2	.2610 1	12.408690 7	.016E-3 1	7.537195	24	2	.26
37874.0	28.07 6	136.610 4	47.250 2	.04387 2	.6696 2	12.409042 9	.016E-3 1	7.534723	28	2	.42
37875.0	32.02 6	133.374 5	47.246 2	.04414 3	.0786 2	12.409393 6	.018E-3 1	7.532454	39	2	.50
37876.0	36.09 6	130.118 6	47.249 3	.04450 3	.4876 2	12.409725 7	.016E-3 1	7.529499	32	2	.57

(MJD)	ω	Ω	i	e	M	n	n'1/2	q	SAO mean elements -- Satellite 1960 Iota 1			N	D	σ			
									n	n'	q						
37877.0	40.086	126.868	5	47.254	3	•044486	3	•8972	2	12.•410103	8	•20E-3	1	7.5226507	29	2	.51
37878.0	43.954	123.637	3	47.247	2	•04515	2	•3074	1	12.•410484	4	•20E-3	8	7.524047	38	2	.34
37879.0	47.833	120.400	3	47.244	2	•04549	2	•7180	1	12.•410884	4	•197E-3	8	7.521224	42	2	.35
37880.0	51.754	117.164	4	47.240	3	•04589	2	•1288	1	12.•411260	5	•20E-3	1	7.517947	22	2	.40
37881.0	55.645	113.910	5	47.245	4	•04628	3	•5402	1	12.•411664	5	•20E-3	1	7.514727	24	2	.47
37882.0	59.454	110.661	5	47.248	4	•04663	3	•9521	1	12.•412070	7	•21E-3	1	7.511750	28	2	.45
37883.0	63.344	107.421	4	47.249	3	•04702	3	•3642	1	12.•412490	6	•21E-3	1	7.508523	23	2	.37
37884.0	67.176	104.182	6	47.249	5	•04748	4	•7769	2	12.•412915	9	•23E-3	2	7.504742	32	2	.60
37885.0	70.953	100.942	4	47.251	4	•04782	3	•19020	9	12.•413365	8	•23E-3	1	7.501899	28	2	.42
37886.0	74.716	97.698	6	47.250	7	•04829	5	•6039	2	12.•41380	1	•22E-3	2	7.497975	20	2	.66
37887.0	78.494	94.449	4	47.255	3	•04866	3	•0181	1	12.•414187	8	•16E-3	1	7.494941	20	2	.41
37888.0	82.166	91.207	7	47.256	5	•04899	4	•4329	2	12.•41465	1	•24E-3	3	7.492124	25	2	.62
37889.0	86.036	87.973	6	47.259	5	•04950	4	•8476	2	12.•41507	1	•24E-3	2	7.487947	18	2	.50
37890.0	89.827	84.728	7	47.261	5	•04985	4	•2630	2	12.•41549	1	•18E-3	2	7.484999	13	2	.49
37891.0	93.426	81.491	6	47.260	5	•05030	4	•6794	2	12.•41594	1	•24E-3	2	7.482185	17	2	.54
37892.0	97.117	78.244	5	47.262	6	•05064	5	•0959	2	12.•41645	1	•24E-3	2	7.478425	25	2	.76
37893.0	100.796	74.998	4	47.260	4	•05099	4	•5130	2	12.•41695	1	•25E-3	2	7.475443	27	2	.67
37894.0	104.546	71.754	3	47.263	3	•05141	4	•9303	1	12.•417424	7	•25E-3	1	7.471964	28	2	.61
37895.0	108.254	68.510	2	47.265	3	•05173	3	•3482	1	12.•417890	7	•24E-3	1	7.469230	28	2	.49
37896.0	111.836	65.265	4	47.262	4	•05195	5	•7670	2	12.•41834	1	•22E-3	2	7.467324	20	2	.70
37897.0	115.526	62.018	4	47.262	4	•05227	4	•1859	2	12.•41883	1	•24E-3	2	7.4646448	17	2	.62
37898.0	119.384	58.772	2	47.267	2	•05263	3	•6047	1	12.•419258	7	•24E-3	1	7.461596	22	2	.45
37899.0	123.114	55.528	2	47.267	2	•05292	2	•0244	1	12.•419711	6	•242E-3	9	7.459120	30	2	.45
37900.0	126.794	52.281	2	47.268	2	•05316	2	•4447	1	12.•420193	9	•25E-3	1	7.457062	29	2	.43
37901.0	130.454	49.026	3	47.271	3	•05337	3	•8655	1	12.42063	1	•24E-3	2	7.455255	24	2	.47
37902.0	134.264	45.780	3	47.266	3	•05366	2	•2862	1	12.421057	6	•21E-3	1	7.452816	24	2	.48
37903.0	138.095	42.532	3	47.263	3	•05391	2	•7074	1	12.421486	9	•20E-3	2	7.450677	20	2	.42
37904.0	141.835	39.286	4	47.262	3	•05409	2	•1292	1	12.421886	8	•18E-3	2	7.449101	26	2	.46
37905.0	145.606	36.039	4	47.263	4	•05430	2	•5513	1	12.422291	8	•20E-3	2	7.447247	23	2	.49
37906.0	149.345	32.788	4	47.266	4	•05446	3	•9739	2	12.422726	9	•21E-3	2	7.445836	22	2	.48
37907.0	153.056	29.545	4	47.269	5	•05464	3	•3970	2	12.423163	8	•22E-3	2	7.444245	30	2	.55

T (MJD)	ω	Ω	i	e	M	n	n'/2	q	N	D	σ
37908.0	156.81 5	26.292 4	47.268 5	.05477 2	.8205 1	12.423622 8	.21E-3 2	7.443009	31	2	.47
37909.0	160.65 7	23.045 5	47.271 5	.05500 3	.2441 2	12.42408 1	.26E-3 2	7.441041	26	2	.50
37910.0	164.38 6	19.793 6	47.272 6	.05517 3	.6685 2	12.42457 1	.20E-3 2	7.439495	25	2	.49
37911.0	168.25 8	16.539 7	47.269 8	.05533 4	.0930 2	12.42509 1	.31E-3 3	7.437988	25	2	.60
37912.0	172.20 9	13.275 8	47.257 7	.05555 4	.5178 2	12.42559 1	.21E-3 2	7.436104	24	2	.66
37913.0	175.91 8	10.026 8	47.260 5	.05567 3	.9438 2	12.426125 9	.26E-3 2	7.434938	22	2	.63
37914.0	179.78 8	6.777 7	47.261 4	.05587 3	.3698 2	12.42666 1	.29E-3 2	7.433110	21	2	.59
37915.0	183.72 5	3.508 5	47.254 3	.05613 2	.7962 1	12.427235 7	.29E-3 1	7.430842	31	2	.47
37916.0	187.55 4	.247 4	47.253 2	.05635 2	.2235 1	12.427789 7	.26E-3 1	7.428906	37	2	.40
37917.0	191.36 5	356.996 5	47.255 2	.05658 2	.6514 1	12.428418 6	.33E-3 1	7.426861	34	2	.41
37918.0	195.23 5	353.731 5	47.252 2	.05679 2	.0798 1	12.429001 9	.29E-3 2	7.424944	37	2	.47
37919.0	199.02 5	350.465 6	47.250 2	.05703 3	.5090 2	12.42963 1	.34E-3 2	7.422814	30	2	.51
37920.0	202.98 5	347.206 5	47.251 2	.05736 3	.9383 1	12.429814 7	.33E-3 1	7.421039	28	2	.43
37921.0	206.72 5	343.954 5	47.254 2	.05759 2	.3690 1	12.430537 8	.37E-3 1	7.418061	35	2	.41
37922.0	210.65 4	340.681 4	47.255 1	.05786 2	.7998 1	12.431181 6	.35E-3 1	7.415653	39	2	.38
37923.0	214.55 3	337.414 3	47.258 1	.05819 2	.2313 1	12.431918 6	.38E-3 1	7.412802	38	2	.36
37924.0	218.30 3	334.138 4	47.261 2	.05847 2	.66402 9	12.432573 7	.32E-3 1	7.410338	29	2	.38
37925.0	222.17 3	330.872 3	47.264 2	.05879 2	.09699 8	12.433280 5	.33E-3 1	7.407530	31	2	.38
37926.0	225.98 3	327.615 3	47.264 2	.05907 2	.53083 9	12.433963 6	.35E-3 1	7.405059	38	2	.41
37927.0	229.70 3	324.353 3	47.267 2	.05936 2	.96560 9	12.434672 5	.388E-3 8	7.402450	39	2	.37
37928.0	233.50 4	321.085 4	47.272 2	.05964 2	.4009 1	12.435379 6	.34E-3 1	7.399978	38	2	.45
37929.0	237.25 4	317.819 4	47.272 3	.05993 3	.8369 1	12.436078 7	.37E-3 1	7.397464	29	2	.45
37930.0	241.12 5	314.548 4	47.288 4	.06030 3	.2734 1	12.436744 9	.32E-3 1	7.394240	23	2	.37
37931.0	244.77 5	311.283 5	47.282 4	.06053 4	.7111 2	12.43741 1	.33E-3 2	7.392197	22	2	.39
37932.0	248.56 4	308.016 4	47.288 3	.06085 3	.1490 1	12.438072 9	.33E-3 1	7.389378	31	2	.48
37933.0	252.34 3	304.752 3	47.287 2	.06115 2	.58755 9	12.438669 6	.297E-3 9	7.386854	35	2	.37
37934.0	256.04 3	301.495 3	47.287 2	.06141 2	.02698 8	12.439309 5	.31E-3 1	7.384540	30	2	.32
37935.0	259.80 3	298.228 2	47.290 2	.06162 2	.46681 8	12.439876 6	.28E-3 1	7.382649	36	2	.32
37936.0	263.45 4	294.962 2	47.291 2	.06183 2	.9075 1	12.440433 6	.24E-3 1	7.380783	37	2	.33
37937.0	267.24 3	291.697 2	47.294 2	.06209 2	.34837 9	12.441003 5	.28E-3 1	7.378482	41	2	.34

Table 7
RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1960 IOTA 1

MJD	Z	ϕ	ψ	D.R.A.	\dot{P}
PERIGEE IN SUNLIGHT					
37785.	1480.	-46.0	94.4	279.2	-0.261E-07
37786.	1487.	-46.6	94.5	279.7	0.261E-06
37787.	1492.	-47.0	94.4	280.3	-0.104E-05
37788.	1498.	-47.2	94.3	281.0	-0.391E-06
37789.	1505.	-47.2	94.1	281.6	-0.130E-06
37790.	1511.	-47.0	93.8	282.3	-0.391E-06
37791.	1516.	-46.6	93.5	282.9	-0.522E-07
37792.	1522.	-46.0	93.1	283.4	-0.782E-05
37793.	1517.	45.2	87.2	103.8	-0.391E-05
37794.	1511.	44.2	87.5	104.0	-0.261E-06
37795.	1506.	43.1	87.8	104.1	-0.104E-05
37796.	1500.	41.8	88.1	104.1	-0.652E-06
37797.	1494.	40.4	88.3	103.8	-0.522E-06
37798.	1488.	38.8	88.4	103.4	-0.169E-05
37799.	1481.	37.1	88.6	102.9	-0.913E-06
37800.	1474.	35.5	88.3	101.8	-0.156E-05
37801.	1468.	33.6	88.1	100.9	-0.143E-05
37802.	1462.	31.6	88.0	100.0	-0.521E-06
37803.	1455.	29.6	87.7	98.8	-0.222E-05
37804.	1450.	27.8	86.9	97.2	-0.391E-05
37805.	1443.	25.9	86.0	95.4	-0.156E-05
37806.	1437.	23.8	85.3	93.9	-0.222E-05
37807.	1431.	21.4	84.8	92.4	-0.222E-05
37808.	1425.	19.0	84.2	90.9	-0.209E-05
37809.	1419.	16.4	83.7	89.5	-0.195E-05

Table 7 (cont.)

RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1960 IOTA 1

MJD	Z	φ	ψ	D.R.A.	P
37810.	1412.	14.1	82.8	87.6	-0.248E-05
37811.	1407.	11.6	82.1	85.9	-0.248E-05
37812.	1401.	9.0	81.3	84.1	-0.259E-05
37813.	1396.	6.5	80.5	82.3	-0.261E-05
37814.	1391.	3.8	79.8	80.6	-0.221E-05
37815.	1385.	1.1	79.3	78.9	-0.235E-05
37816.	1380.	-1.5	78.5	77.0	-0.248E-05
37817.	1374.	-4.3	78.1	75.4	-0.250E-05
37818.	1369.	-6.9	77.6	73.6	-0.215E-05
37819.	1364.	-9.5	77.2	71.8	-0.274E-05
37820.	1359.	-12.2	77.0	70.2	-0.208E-05
37821.	1354.	-14.8	76.9	68.6	-0.273E-05
37822.	1349.	-17.4	76.8	67.1	-0.260E-05
37823.	1347.	-19.9	76.9	65.6	-0.365E-05
37824.	1340.	-22.5	77.2	64.2	-0.130E-05
37825.	1334.	-24.8	77.4	62.8	-0.339E-05
37826.	1330.	-27.0	77.5	61.3	-0.260E-05
37827.	1326.	-29.3	78.1	60.2	-0.273E-05
37828.	1320.	-31.5	78.8	59.2	-0.325E-05
37829.	1315.	-33.6	79.4	58.3	-0.273E-05
37830.	1308.	-35.3	79.7	57.1	-0.254E-05
37831.	1303.	-37.3	80.8	56.8	-0.273E-05
37832.	1300.	-38.2	79.9	54.3	-0.299E-05
37833.	1293.	-40.7	82.6	56.1	-0.273E-05
37834.	1288.	-42.0	83.1	55.5	-0.277E-05
37835.	1283.	-43.3	84.0	55.6	-0.260E-05

Table 7 (cont.)

RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1960 IOTA 1

MJD	Z	ϕ	ψ	D.R.A.	\dot{P}
37836.	1278.	-44.4	84.7	55.5	-0.286E-05
37837.	1273.	-45.3	85.4	55.8	-0.273E-05
37838.	1268.	-46.1	86.1	56.2	-0.248E-05
37839.	1263.	-46.7	86.6	56.5	-0.296E-05
37840.	1257.	-47.0	87.1	56.9	-0.221E-05
37841.	1252.	-47.2	87.4	57.3	-0.247E-05
37842.	1247.	-47.2	87.6	57.8	-0.257E-05
37843.	1242.	-47.0	87.7	58.2	-0.257E-05
37844.	1236.	-46.6	87.6	58.6	-0.224E-05
37845.	1231.	-46.0	87.4	58.9	-0.204E-05
37846.	1225.	-45.2	87.0	59.2	-0.133E-05
37847.	1221.	-44.3	86.4	59.3	-0.910E-06
37848.	1217.	-43.1	85.6	59.2	-0.923E-06
37849.	1212.	-41.9	84.6	58.8	-0.169E-05
37850.	1208.	-40.5	83.5	58.7	-0.871E-06
37851.	1204.	-38.9	82.3	58.3	-0.884E-06
37852.	1200.	-37.1	80.8	57.8	-0.676E-06
37853.	1197.	-35.3	79.1	57.0	-0.598E-06
37854.	1194.	-33.4	77.3	56.2	-0.780E-06
37855.	1191.	-31.4	75.3	55.1	-0.780E-06
37856.	1188.	-29.1	73.2	54.1	-0.988E-06
37857.	1185.	-26.8	70.9	53.0	-0.871E-06
37858.	1183.	-24.4	68.4	51.8	-0.650E-06
37859.	1182.	-22.1	65.8	50.4	-0.104E-05
37860.	1179.	-19.5	63.2	49.1	-0.910E-06
37861.	1178.	-16.8	60.4	47.7	-0.780E-06

Table 7 (cont.)

RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1960 TOTA 1

MJD	Z	Ψ	$\dot{\Psi}$	D.R.A.	\dot{P}
37862.	1176.	-14.1	57.5	46.2	-0.845E-06
37863.	1174.	-11.3	54.6	44.8	-0.832E-06
37864.	1172.	-8.4	51.7	43.3	-0.208E-05
37865.	1171.	-5.4	48.7	41.9	-0.104E-05
37866.	1170.	-2.6	45.8	40.3	-0.182E-05
37867.	1169.	0.2	42.8	38.7	-0.169E-05
37868.	1167.	3.2	40.0	37.2	-0.136E-05
37869.	1166.	6.1	37.3	35.6	-0.164E-05
37870.	1165.	9.0	34.7	34.1	-0.143E-05
37871.	1163.	11.8	32.3	32.7	-0.195E-05
37872.	1161.	14.7	30.3	31.3	-0.195E-05
37873.	1161.	17.5	28.5	30.0	-0.208E-05
37874.	1159.	20.2	27.1	28.7	-0.208E-05
37875.	1157.	22.9	26.1	27.6	-0.234E-05
37876.	1155.	25.6	25.7	26.7	-0.208E-05
37877.	1153.	28.2	25.8	25.9	-0.260E-05
37878.	1151.	30.6	26.1	25.2	-0.266E-05
37879.	1149.	33.0	26.9	24.6	-0.256E-05
37880.	1147.	35.2	28.0	24.3	-0.260E-05
37881.	1144.	37.3	29.3	24.1	-0.260E-05
37882.	1142.	39.2	30.6	24.1	-0.273E-05
37883.	1139.	41.0	32.2	24.4	-0.273E-05
37884.	1136.	42.6	33.8	24.9	-0.299E-05
37885.	1134.	44.0	35.3	25.6	-0.299E-05
37886.	1130.	45.1	36.8	26.4	-0.286E-05
37887.	1128.	46.0	38.2	27.4	-0.208E-05

Table 7 (cont.)

RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1960 IOTA 1

MJD	Z	φ	ψ	D.R.A.	P
37888.	1125.	46.7	39.4	28.5	-0.311E-05
37889.	1121.	47.1	40.7	29.9	-0.311E-05
37890.	1118.	47.3	41.8	31.3	-0.234E-05
37891.	1114.	47.1	42.5	32.4	-0.311E-05
37892.	1111.	46.8	43.2	33.6	-0.311E-05
37893.	1108.	46.2	43.7	34.7	-0.324E-05
37894.	1104.	45.3	44.0	35.8	-0.324E-05
37895.	1101.	44.2	44.2	36.6	-0.311E-05
37896.	1099.	43.0	44.0	37.1	-0.285E-05
37897.	1096.	41.5	43.8	37.5	-0.311E-05
37898.	1092.	39.8	43.4	37.9	-0.311E-05
37899.	1089.	38.0	42.8	37.9	-0.314E-05
37900.	1086.	36.0	42.0	37.6	-0.324E-05
37901.	1084.	34.0	40.9	37.2	-0.311E-05
37902.	1080.	31.7	39.8	36.7	-0.272E-05
37903.	1077.	29.4	38.6	36.0	-0.259E-05
37904.	1075.	27.0	37.2	35.1	-0.233E-05
37905.	1073.	24.5	35.7	34.1	-0.259E-05
37906.	1070.	22.0	34.1	32.9	-0.272E-05
37907.	1068.	19.4	32.4	31.7	-0.285E-05
37908.	1066.	16.8	30.7	30.3	-0.272E-05
37909.	1064.	14.1	29.0	29.0	-0.337E-05
37910.	1062.	11.4	27.3	27.5	-0.259E-05
37911.	1060.	8.6	25.8	26.0	-0.402E-05
37912.	1058.	5.7	24.5	24.6	-0.272E-05

Table 7 (cont.)

RELATIVE POSITIONS OF THE SUN AND THE PERIGEE OF SATELLITE 1960 IOTA 1

MJD	Z	ϕ	ψ	D.R.A.	\dot{P}
37913.	1057.	3.0	23.2	23.0	-0.337E-05
37914.	1055.	0.2	22.3	21.5	-0.376E-05
37915.	1053.	-2.7	21.7	20.0	-0.376E-05
37916.	1051.	-5.5	21.5	18.4	-0.337E-05
37917.	1049.	-8.3	21.6	16.9	-0.427E-05
37918.	1047.	-11.1	22.1	15.4	-0.375E-05
37919.	1046.	-13.8	23.0	14.0	-0.440E-05
37920.	1044.	-16.7	24.2	12.7	-0.427E-05
37921.	1042.	-19.3	25.5	11.4	-0.479E-05
37922.	1040.	-22.0	27.2	10.2	-0.453E-05
37923.	1038.	-24.6	28.9	9.2	-0.492E-05
37924.	1036.	-27.1	30.6	8.2	-0.414E-05
37925.	1034.	-29.5	32.5	7.4	-0.427E-05
37926.	1033.	-31.9	34.2	6.7	-0.453E-05
37927.	1031.	-34.1	35.9	6.2	-0.502E-05
37928.	1029.	-36.2	37.6	5.9	-0.440E-05
37929.	1027.	-38.2	39.1	5.7	-0.478E-05
37930.	1025.	-40.0	40.6	5.9	-0.414E-05
37931.	1023.	-41.7	41.8	6.1	-0.427E-05
37932.	1021.	-43.2	43.0	6.6	-0.427E-05
37933.	1019.	-44.4	44.0	7.4	-0.384E-05
37934.	1017.	-45.5	44.7	8.2	-0.401E-05
37935.	1015.	-46.3	45.3	9.3	-0.362E-05
37936.	1014.	-46.9	45.7	10.4	-0.310E-05
37937.	1012.	-47.2	45.9	11.8	-0.362E-05

NOTICE

This series of Special Reports was instituted under the supervision of Dr. F. L. Whipple, Director of the Astrophysical Observatory of the Smithsonian Institution, shortly after the launching of the first artificial earth satellite on October 4, 1957. Contributions come from the Staff of the Observatory. First issued to ensure the immediate dissemination of data for satellite tracking, the Reports have continued to provide a rapid dissemination of catalogues of satellite observations, orbital information, and preliminary results of data analyses prior to formal publication in the appropriate journals.

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